

THE FAR EASTERN REVIEW

ENGINEERING FINANCE COMMERCE

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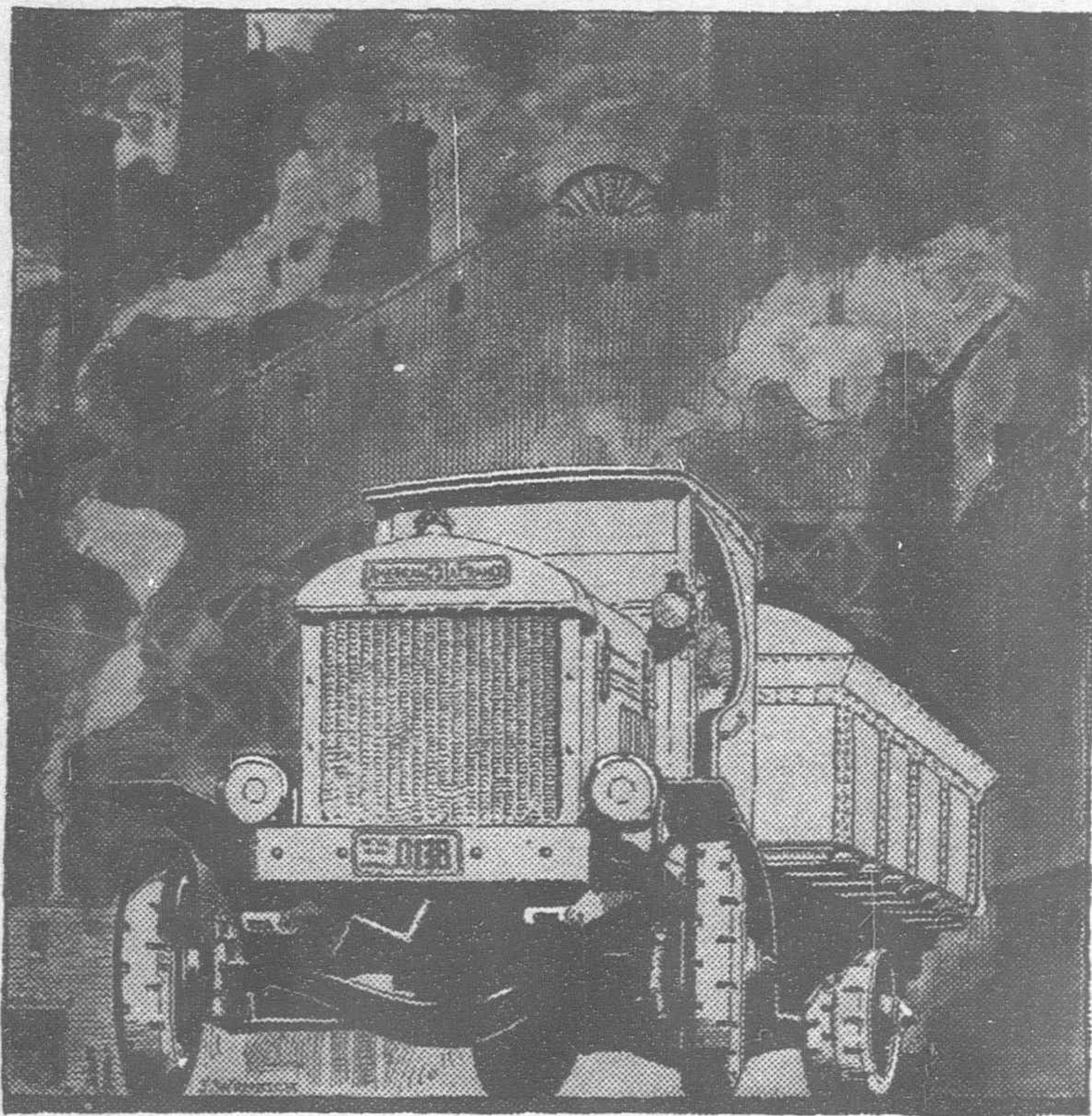
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SHANGHAI, PEKING, TOKYO AND MANILA



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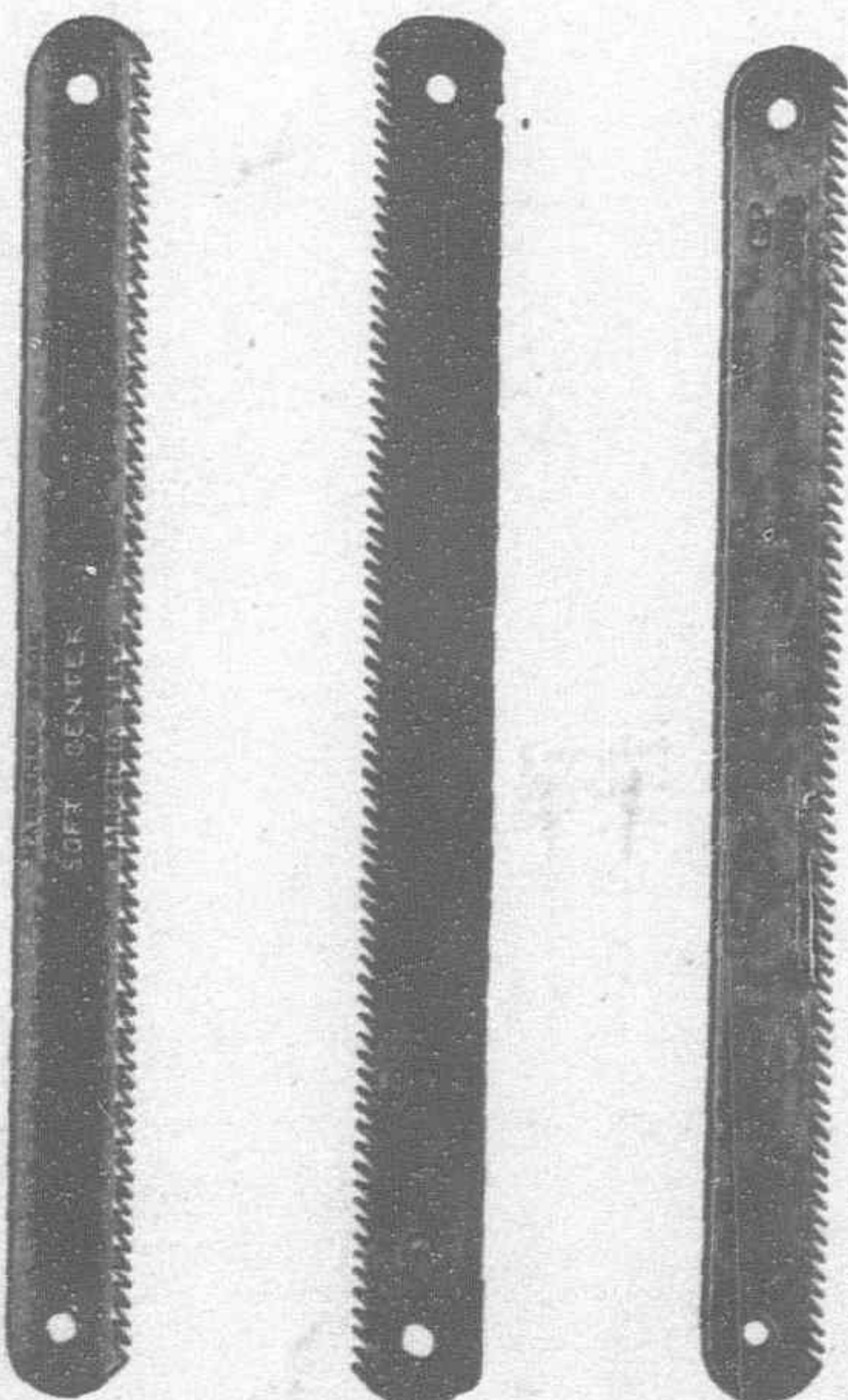
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Japan's Policy in China

Friendship Between the Two Countries a Necessity for Both
Remarkable Statement by Baron Shidehara

IN his address before the Japanese Diet, Baron Shidehara enters fully into the question of Sino-Japanese relationships. Every effort had been made by Japan since the Washington Conference to prove that the revision of Japanese policy was sincere and that all of Japan's efforts were centred upon giving China a "square deal." Yet events occurred which seriously strained those relationships. Nevertheless, the Japanese adhered to their policy of friendship as has been evidenced by their attitude at the Tariff Conference and at the Extraterritoriality Conference in Peking. Little comment is needed on Baron Shidehara's address: it speaks for itself. He said:

"China has recently presented developments of prime importance in her national and international affairs. With the termination of the conflict between the Fengtien and Chihli forces in 1924, all the military factions holding their own in various parts of China seemed weary of internecine warfare, and general repose and stability reigned for a while in the country. The Reorganization Conference of last February concluded its labours with a due measure of success. The question of the Gold Franc, which had remained a long outstanding difficulty in China's external relations was finally brought to an amicable adjustment. The deposit of ratifications by all the signatory Powers of the Nine Power Treaties of Washington was effected on August 5. Administrative reforms promised at one time to make fair progress. We have watched these peaceful and orderly developments of China with sincere gratification. In more than one instance, we have extended our friendly support, direct or indirect, to the efforts of the Chinese made in that direction.

The May 30 Troubles

"Suddenly came the reports in last April that certain elements in China were inciting strikes in Japanese cotton mills at Shanghai, at Tsingtao and elsewhere. Demands for better terms of employment soon developed into threats and violence against employers and police; and, following the most unfortunate incidents which transpired at Shanghai towards the end of May, the agitation took the form of a political movement designed to extort from the Powers the cancellation of existing international arrangements. The disorders then rapidly spread to a great many localities in the country. Such disturbances could no longer be regarded as a pure labour dispute. They were calculated to threaten by force the security of the lives and property of Japanese and other foreigners. We were accordingly compelled to take at once the necessary measures for the protection of our countrymen residing in the localities affected. It was fortunate that in spite of the large number of Japanese residents in these localities, the injuries sustained by them were relatively unimportant. I am also happy to recall the highly efficient and satisfactory co-operation rendered by the officers and men of our China Squadron in affording protection to Japanese residents, and I desire to express, on this occasion, our deep appreciation of their services.

"For the settlement of the international questions occasioned by these disturbances in China, we have been in communication with

the Central Government and local authorities of China, either jointly or separately with the other Powers interested, according to the nature of the particular issues. Some of these issues have already been successfully adjusted. I shall not occupy your time by making reference to the details of the questions, which are much too complicated.

Civil War

"What has been of still more serious concern to us was the outbreak of a new civil war in China last October. Whatever causes, remote or immediate, may have led General Sun Chuan-fang* of Chekiang to rise against the Fengtien Army, are China's domestic affair, on which I shall reserve all comment. It is, however, known in fact that no sooner had General Sun commenced his warlike operations than the Fengtien forces evacuated Shanghai. They then abandoned Nanking and finally fell bank to the Province of Shantung.

"Notwithstanding these successive reverses of the Fengtien Army in Central China, the situation in the Three Eastern Provinces in the middle of November showed no appreciable signs of unrest. Nor was there any indication of an approaching danger that the line of battle might extend to that region. In this situation, men of the Japanese Garrison in Manchuria, whose terms of active service had then expired, were recalled and discharged in accordance with the usual procedure.

The Situation in Manchuria

"On November 24, General Kuo Sung-Ling who then commanded the Fengtien forces stationed near Lanchow, suddenly rose against his chief, Marshal Chang Tso-Lin, and began to march towards Mukden. In accepting the challenge, Marshal Chang seemed to set up his first line of defence at Lienshan far behind the Manchurian frontier. Towards the beginning of December, his forces again retreated from Lienshan without offering much resistance to the invaders, and it became increasingly evident that he had decided to stake his last fortunes on a decisive battle along the Liaoho. With these developments in view, the Commander of the Japanese Garrison in Manchuria issued a warning to both the opposing forces, calling their attention to the nature and scope of the duty incumbent upon the Japanese Garrison.

"The deficiency in the strength of the Garrison due to the departure of discharged soldiers in the middle of November was originally to be supplemented in the present month of January according to the annual programme. Any prior dispatch of men in replacement was to be withheld until the last moment of absolute necessity. An entirely new situation, however, presented itself, when reports from Manchuria came successively to hand from the night of December 14 to the next morning confirming the arrival of a detachment of General Kuo's Army at the opposite bank of Yingkow.

* Now in control of Kiangsu, Kiangse, Anhui, Fukien and Chekiang

We had then seriously to consider the possibility of an impending conflict between the respective forces of Marshal Chang and General Kuo in the open port of Yingkow. Our Garrison had now to keep special watch over a zone of the South Manchuria Railway extending from Yingkow in the south to Tiehling in the north. *It became obvious that with the actual reduced strength of the Garrison, the satisfactory fulfilment of its mission over such an extensive zone was well-nigh impossible.*

"It was not doubted that both Marshal Chang and General Kuo had taken due note of the warning given by the Japanese Commander, and that in their military operations, they would fully respect the rights and interests of Japan. We could not, however, dismiss from our mind the apprehension that in the event of desperate engagements lasting for several days on all fronts, the belligerents might unconsciously be driven to the railway zone, to carry on street fighting and other forms of warlike operations. It has also happened in many past instances that remnants of a defeated army, let loose from all control and discipline, have sacked towns and terrorized the population. **Having regard to the imminence of such danger, which manifested itself on December 15, the Government decided at once to proceed to the reinstatement of the Japanese Garrison in Manchuria at its normal strength as maintained prior to the middle of November last. With the restoration of general peace in that region, following the decisive battle of the Liaoho, the supplementary troops sent to Manchuria in the circumstances above described were promptly recalled to their original posts, and all emergency measures came to an end.**

Japan's Policy

"It will thus be observed that throughout the recent civil strife in China, as in the case of the Fengtien-Chihli conflict of 1924, the Japanese Government have consistently followed the definite and settled policy announced in the last session of the Imperial Diet. That policy has in view (1) absolute non-interference in China's domestic affairs, and (2) the safeguarding of Japan's rights and interests by all legitimate means at our disposal.

"There are apparently certain sections of public opinion which are swayed by prejudice in their judgment of Japan's action in Manchuria. The reinstatement of our Manchuria Garrison at its pre-existing strength has been misconstrued as if it had been designed to help the Fengtien Army. The objection interposed by the Japanese Commander against either of the warring parties entering the port of Yingkow has been misrepresented as an act directed solely against General Kuo's military operations. Every occasion has been utilized to place Japan in a false light. We deplore these unfounded and undeserved accusations, and in denying them categorically, we are confident that history will be the final judge of our clear conscience. I would make use of this opportunity to express our sincere satisfaction to our civil and military authorities in Manchuria who, in the face of the recent grave situation, have successfully carried out the policy of the Government in perfect harmony and co-operation, and have further done all they could, solely in the interest of humanity, to save the lives of soldiers and adherents of the vanquished party.

Japan's Position

"While we have most scrupulously avoided all interference in China's internal politics, we have not failed to take every possible measure with a view to safeguarding our rightful position. It is a well-known fact that Japan possesses essential rights and interests both corporeal and incorporeal, in the region of Manchuria and Mongolia. Of such rights and interests, those that have taken a tangible shape, and are liable to destruction by acts of war, are now mainly to be found along the line of the South Manchuria Railway. In order to protect them from destruction, we have been constrained to make necessary provision, which, we believe, has duly accomplished its end. With regard to our rights and interests of an immaterial kind, they did not seem likely to be affected by the war, and we are satisfied that they have in fact remained entirely unaffected.

"No doubt, the complete tranquility of the whole region of the Three Eastern Provinces, undisturbed by any scourge of war, is highly to be desired, in the interest of the native population as well as of Japanese residents. *It is, however, a responsibility that properly rests upon China. Assumption of that responsibility by Japan without just cause would be manifestly inconsistent with the*

fundamental conception of existing international relations, with the basic principles of the Washington Treaties, and with repeated declarations of the Japanese Government. By taking such course, we would forfeit our national honor and pride once for all. In no case and by no means, can we be a party to so improvident an action.

Tariff Conference

"I now turn to the subject of the Special Conference on Chinese Customs Tariffs actually in session, and propose to offer a brief explanation. Close observers of developments in China cannot fail to note growing signs of a political awakening among the Chinese people. The old China is disappearing, to give way to a new China. Extending, as we do, our sincere good wishes for her healthy progress, we are not without a feeling of deep concern for the future of that nation, in witnessing the tendency of certain sections of the promising young generation, who, misled by groundless reports and sinister propaganda, are easily attracted to political activities of a dangerous and destructive nature. In any case, it would be a gross mistake to ignore the considerable changes that have taken place in the situation of China in recent years. Military potentates may rise or fall by the fortune of war. But national consciousness once kindled can never be suppressed. Any pressure brought to bear upon it will only make it still deeper. One phase of such self-awakening among the Chinese people has taken the form of a craving for tariff autonomy. In full realization of this situation, we formulated our line of policy relating to the Customs Conference.

"As soon as the Conference was opened on October 26, the Chinese Delegation submitted the question of tariff autonomy as was quite anticipated. Pursuant to the defined policy of the Government, the Japanese Delegation expressed themselves ready to take up the question in sympathy with the position of China and in close communication with other Powers. The manifold difficulties that had stood in the way of unanimous action were successfully overcome, and on November 19, at a meeting of one of the Committees appointed by the Conference, a resolution was passed on the subject of the acceptance of China's tariff autonomy. At the same time, what we have constantly in view is the co-existence and common prosperity of both Japan and China. What we are seeking to attain is an adjustment fair and equal to both parties. We are confident that the Chinese people entertain no such unreasonable desire as to satisfy exclusively their own position, without any regard to whatever effects may be suffered by Japanese industry and commerce.

"Since the beginning of December last, the increasing gravity of the internal situation in the country has naturally retarded the progress of the Conference, only informal meetings being held from time to time. We trust that the work of the Conference will be continued and expedited as far as circumstances permit.

Extraterritoriality

"The Commission on Extraterritoriality in China is now also in session. We have always been sympathetically disposed towards the just aspiration of the Chinese people to recover full judicial authority, and we are looking forward with keen interest to the findings and recommendations which are to be made by the commission conformably to the Resolution of the Washington Conference."

* * *

The Textile Situation in China

IT is an interesting fact that while the number of cotton mills in China increased between 1923 and 1925 from 119 to 122, the number of Japanese-owned mills during the same period increased from 41 to 45, while the British-owned mills decreased from 5 to 4. There are no American-owned cotton mills in China. The total number of Chinese-owned mills is 73 in 1925 which is exactly what it was in 1923, but it is no closed secret in China that many of the Chinese-owned mills have been mortgaged and it is not impossible to suggest that they have been mortgaged to Japanese banks. The effect then is that Japan has a huge interest in the textile industry of China, totalling in spindleage, 1,326,920 spindles 7,205 looms, employing 59,688 laborers. The total capitalization of the Japanese-owned cotton mills in China is Taels 5,400,000 and Yen 112,700,000 while the reserves amount to Taels 1,270,000 and Yen 160,005,000. The total investment

in both Chinese and foreign-owned mills amounts to Taels 50,645,-000 Chinese \$69,540,000, Yen 112,700,000 and Fengtien \$4,500,000. Although these figures are in the varying currencies usual in China, it can readily be seen how large a part the Japanese-owned mill plays in the industry.

The importance of the national relationships in China's principal industry lies in the foreign interest in peace and stability in the country. From the standpoint of investments in China, Japan's interest in the peace of the country is paramount. Japan is ready to invest still further capital in the textile industry of China, an investment which in no way impairs the sovereignty of the country, but which does on the other hand, bring great wealth to the country. The strength of the Japanese mills lies in their experienced management and their large reserves, which makes it possible for them to purchase their raw materials abroad at advantageous prices, while the Chinese-owned mills, which are not so well capitalized are forced to purchase their raw cotton whenever they have available capital and often in an unprofitable market. The Japanese mills also have the advantage of over the British mills of a lower overhead for management and of a more comprehensive grasp of the market in which the goods is to be sold. The result is that the Japanese mills have been singularly successful in spite of labor and political troubles.

The four British cotton mills are all in Shanghai. The Japanese-owned mills are scattered throughout the country as follows: 32 in Shanghai, 6 in Tsingtao, 1 in Hankow, 3 in Manchuria. The distribution follows the general centres of trade and does not adhere to the policy of keeping foreign industries in the treaty ports. The Japanese mills in Tsingtao and Manchuria have been able to continue in spite of civil wars and labor trouble. On the subject of labor, it must be noted that although the Chinese have contended at various times that the British and Japanese mill-owners are responsible for any conditions to which they object, it is interesting to note that 133,671 laborers are employed in the 73 Chinese-owned cotton mills, while 76,088 are employed in the 49 foreign-owned cotton mills, almost half the total number being under foreign management.

* * *

The Population Problem of Japan

IN an interesting booklet published by the Japan Society two interesting questions are asked: What is the population of Japan? How much of the land is under cultivation? Both questions are answered as follows:

What is the Population of Japan?

The estimated population of the Empire of Japan is 80,000,000. The population of Japan proper is about 56,000,000.

The census of 1920 showed 376 people to each square mile in Japan proper, making Japan stand third in the list of countries rated according to density of population. Belgium had 658, Netherlands 536, and Great Britain 374 inhabitants per square mile. The population per square mile in Rhode Island in 1920 was 566.4; in New York State 217.9; in California 22, and in Oregon 8.2.

How Much of the Land is under Cultivation?

Of the 129,250 square miles of the main islands of Japan, only 28,560 square miles (18,278,400 acres) can be cultivated. Of the 260,738 square miles in the Empire, 17 per cent. of the land is arable, the 83 per cent. remaining being made up of mountains, rivers, lakes, forests, and waste land. Over 50 per cent. of the arable land is devoted to the cultivation of rice. About 1,250,000 acres are given over to growing mulberry trees on which the silk worms feed. Other products are barley, rye, wheat, tea, millet, buckwheat, Indian corn, bamboo, tobacco, beans, sweet potatoes, egg plant, mushrooms, radishes, parsnips, lotus, plums, pears, peaches, persimmons, oranges, grapes and apples. Crops of any size can, of necessity, be produced only by intensive cultivation and the use of every bit of land that will lend itself to cultivation. Much of the land is irrigated. The rivers of Japan are swift and shallow, for the most part, affording a means of irrigation and power rather than communication.

The population and land problems are the most serious affecting Japan at the present time because upon them hinge not only internal stability but the whole international policy of the Japanese Government. Japan with a population of 56,000,000 within Japan

Proper has a cultivatable area of only 28,560 square miles. Only 17 per cent. of a very small country with a large and growing population is under cultivation and of that small area 50 per cent. is consumed in producing rice which is the staple article of food but is not sufficient to satisfy human wants not is it a food upon which laborers in modern industry can subsist.

The "White" Countries

Japan has for years been seeking an outlet for the surplus population of her island Empire. Two outlets have been available, namely the more sparsely settled countries under the control of European nations which require hard-working, well-behaved laborers to build them up and weak nations of Asia, such as Korea and Formosa which Japan annexed. The European and American nations, following a policy of keeping those parts of the world which they control, "white," have been unwilling to permit large or even moderate immigrations of Japanese laborers, and have insisted upon so controlling the number of Japanese to enter their countries as almost to make them unavailable for immigration purposes. Furthermore, immigration to many of these countries by Japanese leads to such unfortunate political complications, that the Government of Japan itself discourages the Japanese laborers from attempting to go to those places. Baron Shidehara, Minister of Foreign Affairs, in his address before the Japanese Diet on January 21, 1926, discussing this question said:

I would add a few words with regard to the question of emigration. It is not in our policy to send emigrants to any country in which they are not welcomed. Our constant desire is to supply capital or labor to undeveloped regions of the world and to promote the welfare and prosperity, not only of the emigrants themselves and of their mother country, but also of the countries in which they choose to establish their permanent homes. Towards this end we are prepared to exert our unremitting efforts."

Where to Go

The problem then is: To what countries, can Japan send immigrants for whom there is no place because of the congestion of population within the Empire? No matter how unjust the "white" movement is in European and American countries, no matter how unfair it is for any race to insist upon its own superiority and yet to speak of democracy and equality, it is not policy for Japan constantly to be raising the racial issue, when on all other questions there is absolute friendship and understanding. There can then be only one part of the world to which Japan can turn with an assurance that in justice there can be no objection to Japanese expansion, for in that part of the world, there are no racial objections to Japan's expansion, there is sparsity of population, there is a need for laborers, there is a need for capital, there is a need for agricultural, industrial and every form of economic development. That place is that part of the continent of Asia which for centuries has been altogether without development, Manchuria, Mongolia, the hinterland of China, the homes of almost extinct races, the natural, the normal sphere for Japanese development.

China does not Object

And one of the surprising phases of this situation is that on the whole, China offers no objection to such expansion of the part of Japan. For wherever Japan has gone, the Chinese have benefited. In Manchuria, Japan has made enormous investments upon which the returns have yet to come, but the Chinese laborer merchant and banker, has already reaped enormous profits and he will reap more as Japan sows more seeds, for it is clear that for every Japanese who goes into these territories, 100 Chinese also go to benefit by Japanese effort, to make their fortunes in new territories opened and as auxiliaries to new industries brought into an erstwhile barren country. That has been the experience in Manchuria since the South Manchuria Railway developed that country and that will undoubtedly be the experience everywhere. One may occasionally hear protests against Japanese activities in Manchuria in Shanghai and other radical centres of China, but not in Manchuria where the Chinese and Japanese live of terms of friendship and co-operation.

The tendency for Japanese emigration then must be toward the sparsely settled parts of Asia. The United States would welcome such a solution as solving one of America's outstanding problems. China would not seriously object, for Manchuria and

Mongolia are not Shantung. The only strong objector would be Soviet Russia, which has imperialistic design upon those countries, and therein lies a serious problem for the future. On that question, Baron Shidehara's address throws a clear light. He said:

Japan and Soviet Russia

"We seek no exclusive friendship with any nation: we extend honest friendship to all nations. We believe that this is the wisest course for Japan to pursue. With this end in view, we should avoid all hasty conclusions as to the intentions of other powers, based on mere stretches of imagination unsupported by concrete evidence. In many cases, unjust suspicion and unwarranted prejudice have been at the root of serious international complica-

tions. In approaching at this juncture questions of Russo-Japanese relationship, we should carefully bear in mind these considerations. Rumours have recently been circulated, charging the Soviet Union with certain aggressive designs in North Manchuria. So far as my information extends, I have discovered no ground for attaching any credence to such reports. Since the resumption of official relations between Japan and the Soviet Union a year ago, we have constantly maintained close contact with the Soviet Government, and have effected frank exchanges of views and information from time to time, on all questions affecting the mutual relations of the two countries. Throughout such proceedings, we have been striving to dispel all groundless misunderstanding, and to promote friendly intercourse between the two nations. We shall continue to use our best efforts in the same direction."

The Inhuman Immigration Law

THE various bills before the United States Congress for the humanizing of the Immigration Law is another indication that the American people are reverting to the principles of human liberty which founded and sustained the nation until the war hysteria affected the mentality of its law-makers. The Immigration Law, as it to-day stands on the statute books, is not "humanized"; it is not even humane. To separate husband and wife, father and child, is a governmental expedient which has not been used by any other civilized nation and it is hardly probable that any other nation would adopt such measures even as retaliation. The fact that the legally wedded wife of an American citizen does not through marriage become American while because of her marriage, she loses her former nationality, is as immoral a measure as has ever been devised by legislative ingenuity. There are thousands of women in the world who have become denationalized because they have been willing to marry Americans. Thousands of women in Europe and Asia find themselves in difficulties because they have found affection for American citizens. The act which made it necessary for them to become literally "without a country," was one of those post-war stupidities of the exceedingly Nordic mind, the worst form of megalomania which has yet appeared in western civilization.

Even before the present measures were passed, Asiatic women marrying Americans could not adopt the nationalities of their husbands. Even when the Asiatic women were British or French or any kind of European citizens either through birth or a previous marriage, citizenship in the United States through marriage to an American citizen was closed to them. A Chinese of British citizenship, born in a British colony, the daughter of British-born father and mother, could not adopt the citizenship of her husband and was totally denationalized because of this inhuman interpretation of the Exclusion Act. The theory upon which the Government acted was that marriage could not be utilized as a subterfuge to obtain citizenship by those to whom ordinarily citizenship was closed. As though decent people would use marriage as a subterfuge! This interpretation of the law has caused much suffering and has led to a misunderstanding of the character of Americans in Asia.

It is impossible to force any nation to open its doors to the people of other countries. Every nation has the sovereign right of determining what persons shall be eligible to citizenship. But no civilized country has been so unchivalrous as to strike at women, to place such a premium upon morality and marriage and the whole social fabric of modern society. It is time to raise the Exclusion Act and other inhuman acts upon a broader basis of decency and good neighborliness. If the United States desires to exclude Asiatics that end should be accomplished without insult to the nations excluded. The present Exclusion Acts offended the Japanese, the Chinese and all the peoples of Asia. It is remarkable how inconsistent a democratic government can be. The American Government maintains Trade Commissioners in China and Japan, who are little more than propagandists for the United States, to create sentiments of friendship for the United States and to encourage

the purchase of American goods and at the same time creates so unfavorable an impression in these countries by offensive measures against the same people with whom the United States desires to do business.

Americans are used to believing that only the Japanese are offended by the Exclusion Acts and their enforcement. The Chinese find these acts even more offensive than do the Japanese because the Chinese have not even a Government to fight against injustices by immigration and customs officials when Chinese legitimately enter American ports. Merchants and educators are offended by men who in many respects are not unequal to the Chinese coolies who in Shanghai carry the baggage of these merchants and educators. A Chinese Diplomatic Officer was once addressed as "John Chinaman" by a Customs official who could not read the Diplomatic Passport in French which this fine Chinese gentleman bore. One of the most important men of China was once rudely treated in a western port by a customs official although the American authorities in China had cabled to Washington asking for courtesies to this gentlemen who was a graduate of an American university and a protagonist of American interests in China. All the money that is spent on education and health and missionary activity in China by Americans cannot wipe out the inhumanity the ungentlemanliness of such treatment. A fair deal to all, discrimination to none—there can be no offense. Discrimination, the assumption of superiority, can only produce hatred. For even in China it is known that not all "white" men are gods and that even in the United States there are street cleaners and coal miners, who are not Chinese coolies.

On this general subject, it is of interest to quote from an editorial in the *Boston Post*:

"The United States is able to maintain its strict Japanese exclusion policy only because it is the strongest nation in the world and because it resolutely refuses to submit to any sort of arbitration the question of its right to discriminate against any race or races it sees fit.

"We dare not arbitrate the question of Japanese exclusion. Even those who believe most strongly in it admit that from the standpoint of international comity the exclusion can hardly be justified. We can defend Japanese exclusion only on the theory that our interests are exclusively domestic. The moment we agree that we are in duty bound to join with the rest of the world in removing the causes of international disputes who can doubt that we must in the end surrender on Japanese exclusion?"

"Of all questions at issue in the world, international experts are agreed that Japanese exclusion is the one most likely to lead to war in the future. Suppose we go into the World Court. Japan is a member on equal terms with us. A distinguished Japanese statesman is one of the judges of the court. We can't exclude him as a judge. He will have just as much to say about the affairs of the world as an American judge (if we get one)."

Trade with China

RECENT reports on conditions in China, according to the *British Trade Review*, are distinctly more favorable and a more hopeful feeling is prevalent among manufacturers and shippers in this country whose business it is to supply the China market. This revival of hope is more particularly noticeable in Manchester; stocks of cotton goods in China have for some time been insufficient for normal requirements and should the promise of more settled times be realised, the demand for Manchester goods cannot fail to be extensive. The outlook has improved substantially since the recently published report on the situation by the British Commercial Secretary in Shanghai was written. At that time, nearly six months ago, it was "hardly possible to regard the economic situation and the prospects for foreign trade in China in the immediate future with anything approaching optimism." but there seemed even then no reason to doubt that whatever political developments might take place and whatever new trading conditions might become necessary in the future, China must still remain one of the greatest potential markets of the world. In the last few months and more particularly in the last few weeks a tendency to settle down has been sensed by onlookers and it may be that this tendency will develop into something more tangible. Should the improvement in the political situation be maintained, trade development may be expected shortly after the Chinese New Year, when it is hoped that it will be possible for the auctions in Shanghai to be resumed. Apart from the signs of abatement of civil strife there are indications that a settlement of other difficulties which have stood in the way of the normal transaction of business is not impossible in the not too distant future.

Speaking at the annual dinner of the Oxford Chinese Students' Society, the Chinese Acting Minister in London referred to the claim for tariff autonomy which the Chinese government had brought forward at the Peking Conference. He said he had received information that the Powers concerned had accepted the principle of tariff autonomy and that prior to tariff autonomy and during the interim period the Chinese Delegation has presented a plan by which China would increase 5 per cent surtax on general merchandise, and also impose on luxury goods from 20 to 30 per cent. He also said that the Chinese Delegation had promised to present a concrete scheme to abolish likin and all kinds of transit taxation which would be carried out within three years. The national tariff law of China, he added, would be enforced in 1929, provided the abolition of likin was also carried out effectively at that time.

The extent to which likin and the levying of transit taxes impedes trade is known to every house which does business in China, but the following remarks by the British Commercial Secretary at Shanghai, to whose report allusion has already been made, are of particular interest in view of the forecasts of the Chinese Acting Minister:—"Owing to the absence of any central authority," says the Commercial Secretary, "each province is practically at liberty to adopt its own measures for raising revenue, and the imposition of taxes on commodities of every description usually appeals to the local official as being the simplest method. With regard to foreign imports, taxation is nominally limited, under the treaties between China and the Foreign Powers, to 5 per cent customs duty and a further 2½ per cent if the goods are sent into the interior, and although complaints of additional levies on cargo, either in transit or on arrival at its destination, have always been rife, these impositions were formerly not sufficiently onerous to interfere very seriously with the general course of trade. Of late years, however, the respect for treaty obligations has been rapidly diminishing in China, and during the past twelve months the inclination of local authorities to levy 'consumption' or other taxes on foreign goods has become much more pronounced. Beginning with a tax of 20 per cent on cigarettes the movement has extended to kerosene oil and various other commodities, and owing to the lack of any Central Government capable of exercising pressure on provincial authorities, protests against such impositions produced but little effect. Apart from the taxation above referred to, which has at least a semblance of legality as being imposed by the officials administering the Government of the particular province concerned, goods conveyed along the internal land and water-routes have also to run the gauntlet of tax-stations controlled by local military officials, who levy further 'protection' taxes solely for their own benefit. The cumulative effect of these impositions, which naturally apply to

produce on the way down to the port of shipment as well as to imports, is to add so materially to the laid-down cost of the former as to prejudice the chance of finding a market in foreign countries, and in the case of imported goods to raise the price to the ultimate consumer to such an extent as to decrease considerably the volume of sales." Should an agreement be reached of the kind outlined by the Chinese Acting Minister, and should the state of the country permit of the Chinese Government enforcing the conditions of such an agreement, a tremendous impetus would be given to the export trade to China. These are two big "ifs" but there is no reason why we should not hope for the best.

* * *

Position of Indian Railways

AT the Railway Conference recently concluded in Calcutta the Commerce member alluded, with manifest regret, to the failure of the railways, in the current as also in the preceding year, to maintain their capital expenditure at the level prescribed in the sanctioned programme. It is said that important and beneficial as recent administrative and financial reforms affecting Indian railways have proved, in the respect mentioned they have been distinctly disappointing.

When the Indian Legislature endorsed a five year program involving an aggregate outlay of 150 crores, the decision was welcomed as affording railway agents an opportunity of overtaking arrears of capital outlay not only complained of, but held forth as the primary explanation of the many handicaps and deficiencies of transport from which Indian trade and industry have suffered. The railway administrations urged that if the financial starvation of Indian railways were to cease the complaints of inadequate transport would soon be a thing of the past. On this plea the 150 crore program was formulated and sanctioned, and grants duly allotted, but the money has not been spent; or, rather, it has only been spent to the extent of 50 per cent. of the sanctioned outlay.

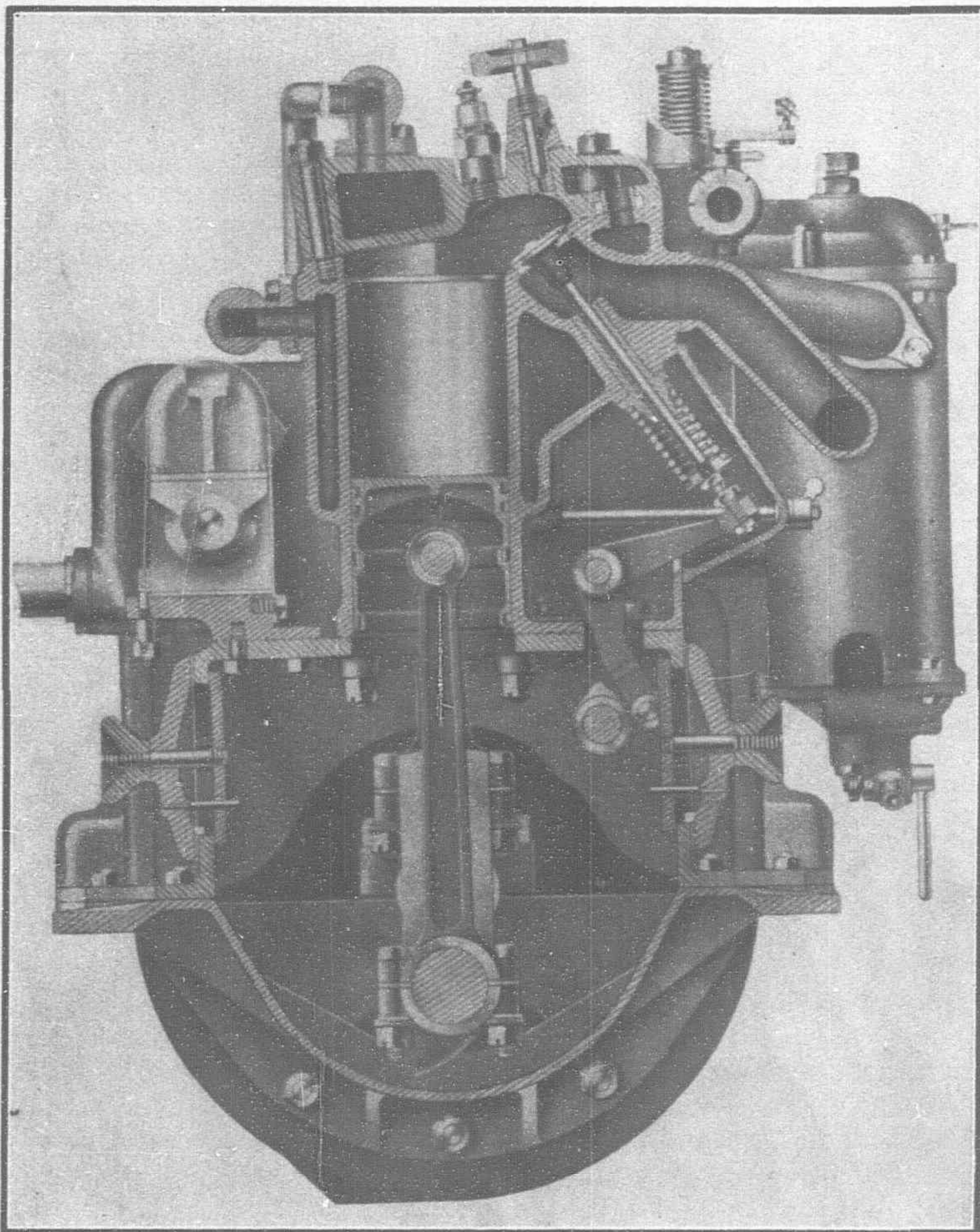
Writing on this subject a Calcutta correspondent to the Times Trade Supplement says: Formerly the onus of railway deficiencies by common consent was placed upon the broad shoulders of the Finance Department. It is now a question not of providing the necessary funds (official balances had swollen so abnormally that it was decided, quite unexpectedly, to refrain from issuing a rupee loan in the current year), but of inducing the railways to equip their construction staffs to the extent necessary to ensure full utilization of the money at their disposal.

The injury inflicted by the virtual collapse of the 150 crore program affects two widely separated interests. It affects Indian trade, circumscribed by inadequate means of transport. It also involves a severe and needless limitation of valuable contracts, quite reasonably looked for, by firms operating both here and in Great Britain whose capital and skill are utilized in the manufacture of railway materials.

There is cause here for serious enquiry, the commercial community feeling, not for the first time, that trading interests have been sold a "paper balloon"—artistic indeed in design, not incapable of a spectacular flight, but lacking weight and substance and, constituting in effect, of course, quite unintentionally, a wholesale nullification of the published programme of railway improvement and extension. During its next Session the Indian Legislature, which sanctioned the capital grants, will quite justifiably demand an explanation of their non-utilization except on the limited scale disclosed by the Commerce member. Strong complaints are made that, while railways have lagged in carrying out their construction programs mainly owing to reluctance to call in the aid of private firms, they have shown no lack of vigour in competing with private enterprise by opening up, not very opportunely, a series of new railway collieries, a form of development of railway activity which, it is urged, might well be deferred until coal privately mined is in less generous supply. Concurrently there is proceeding a vast development of railway workshops, useful no doubt, but less urgent than line extensions, from which again private enterprise is now wholly—in commercial opinion, harmfully—excluded. One railway has just opened a seaside hotel. Such side lines are attractive; meanwhile, apparently, the larger tasks are being neglected.

For Engineers

WE have received an interesting brochure from Gleniffer Motors, Ltd., which "has been prepared," according to the pamphlet, "with a view to providing a maximum of information regarding our Marine Outfits in a way which will be most readily understood. The sterling qualities of our products have been acknowledged in every corner of the Globe for many years.



Sectional view of engine, showing the arrangement of the principal working parts. The valve operating mechanism is clearly shown, also the shape of the combustion chamber and valve passages, the latter giving a particularly easy flow to the gases.

The fact that large numbers of these engines have been supplied to leading public bodies is sufficient testimony to their accepted worth. To mention a few, these include, the Admiralty, the Ministry of Fisheries, the Fishery Board for Scotland, the Crown Agents for the Colonies, most of the leading Shipping Companies, many Foreign Governments, etc., etc."

Japanese-American Trade

K. Shibagaki, Manager at Seattle, Mitsui & Co., Ltd.

TRADER between United States and Japan is not competitive, it is complementary. Japan has materials which the United States seeks and the United States has products which Japan requires. They are not rivals in the markets of the world. Cotton, mineral oil, machinery, iron and steel and wheat are United States' principal exports. Japan's are silk and tea. Blessed with this absence of desperate rivalry and competition is the economic reason for the friendly feeling between the two nations.

In 1909 value of Japan's purchases from United States was twenty-six million dollars. In four years it quadrupled, and in fifteen years increased one thousand per cent.

Few people fully realize the extent of Japan's economic relations with the United States. Seven per cent of Japan's total

national wealth is annually engaged in foreign trade, whereas only two per cent of United States' national wealth is so engaged. Theoretically, therefore, Japan is three times as much interested in international commerce as is United States. Forty-five per cent. of Japan's exports go to the United States, making your country by far Japan's best customer. China is second, taking twenty-four per cent, India third with six per cent and France and Great Britain, five and three per cent, respectively.

Five commodities exported by Japan account for 66 per cent of its total export trade. Of these raw silk ranks first, constituting 41 per cent of all exports. Ninety per cent of this raw silk is sold to the United States. The American market for raw silk, therefore, provides Japan with 36 per cent of its export trade.

There are few countries in the world whose economic relations of one to the other share so large a percentage of one another's trade.

Of Japan's other principal exports, America takes a quarter of the silk goods, a third of the pottery, and ninety per cent of the tea. Japan sends to the United States a number of commodities of lesser value including camphor, straw braid, waste silk, beans, etc.

United States is Japan's principal source of supply, 31 per cent of Japan's imports coming from your country. United States supplies over twice as much in value to Japan as any other country; India being second with 14 per cent; Great Britain third with 13 per cent; China fourth with 10 per cent; Germany, 6 per cent; Australia, 4 per cent, and so on down the line.

Raw cotton was Japan's principal import from the United States. Your country supplies 41 per cent of Japan's machinery; 70 per cent of the lumber; 60 per cent of Japan's iron bars, rods and plates; 80 per cent of the kerosene; 93 per cent of the sulphate of ammonia; and 80 per cent of our construction material. Eighty per cent of Japan's automobile imports are of American make.

Most of these commodities are competitive, in the sense that other countries can supply them. Nevertheless Japan is United States' best customer for the products which have been mentioned.

If Columbus had discovered America on the Pacific side instead of on the Atlantic side, the markets of Asia would have been much more developed than they are. Heretofore, Europe has been United States' outlet for its products. Now your nation is awakening to its opportunities to the westward. These ambitions have brought you gentlemen to this Convention in Seattle—America's nearest port to the Far East. Your attention now attracted to the potentialities of the Far East in trade, it is not amiss to mention opportunities for investment of American capital. With the gaining confidence of each year of the safety of these investments, and the interlocking of capital, and establishment of branch factories both nations are bound to profit.

In contrast to your own country, which is considered to be the wealthiest in money and natural resources, as well as the most alert in progress, picture a nation across the Pacific, hardly the size of the State of Washington with a population of over seventy million. The capital city itself has nearly twice as many people as the whole State of Washington. It has been scarcely half a century since Commodore Perry opened Japan's door to commerce. Your country's commerce is from three to four times as old as ours. Japan has been very vigorous to take up civilization. We are very proud that we have done it so fast and so well. With the passage of time Japan has tended to become more and more industrial and interest itself in foreign trade. Prior to that it was concerned in domestic matters and agricultural pursuits. New industrial processes accompanied by demand for new types of goods, found our country lacking some of the essential commodities of modern industry. To obtain these we have been compelled to buy from the countries more experienced in manufacture. In order to balance these high valued imports it was necessary to increase our interest in foreign trade and create a demand for our exports.

Foreign trade made great progress in twenty years. Total foreign trade of Japan in 1904 was 816,000,000 yen. In 1924 it amounted to 3,677,000,000 of which 1,677,000,000 yen were exports and 2,000,000,000 yen imports.

In the conduct of this mutually advantageous trade and on the basis of equality of opportunity it is necessary that business men should meet to discuss their common problems. In no other way can different viewpoints be understood and the many commercial problems analyzed and solved.

Stimulation of foreign trade and understanding between nations is brought about through commercial channels.

The Chinese Eastern Railway

Its Redemption by the Chinese Government

THE FINANCIAL INVOLVEMENTS

By Fisher Y.C. Yu

THE attention of the world is now drawn to the Peking Special Tariff Conference authorized at the Washington Conference, for the purpose of revising the Chinese Customs Tariff. The questions involved are undoubtedly important from the financial and the political standpoint. But what seems to me to be of greater significance than the increase of customs tariff or, perhaps, the restoration of the complete tariff autonomy—a question that has vast bearings upon the political, economic and social life of China and possibly the peace of the Far East—is the question of the Chinese Eastern Railway and its redemption by the Chinese Government. The present tariff conference is important in that it paves the way for the accomplishment of this vital end. But the importance of this question is at present so much obscured and so little appreciated that I consider it necessary to present the situation surrounding the Railway and to point out the significance thereof.

In the original contract between China and the Russo-Chinese Bank (now Russo-Asiatic Bank) dated September 8, 1896, concerning the construction and operation of the Chinese Eastern Railway, it was stipulated thus:

"... At the expiration of thirty-six years from the day on which the entire line is finished and traffic is in operation, the Chinese Government will have the right to buy back this line upon repaying in full all the capital involved, as well as all the debts contracted for the line, plus accrued interest."

As far as record shows, the entire line of the Chinese Eastern Railway connecting the Trans-Siberian line with Vladivostok across Manchuria together with the line south from Harbin to Port Arthur was completed in the fall of 1901. Accordingly, China may exercise her right to purchase the Railway in 1937, or twelve years from now.

It is the purchase of the Chinese Eastern Railway that our interest must be focused on and adequate machinery should be set up for its consummation.

The Issue Admits No Alternative

Section 29 of the Agreement defining the

Statutes of the Chinese Eastern Railway Company provides for the gratuitous entrance into possession of the Railway by the Chinese Government after the expiration of 80 years of possession by the Chinese Eastern Railway Company. Should China elect to waive her right of redeeming the Railway in accordance with the option, she would, in theory, come into its possession free of all charges at the end of the present century.

In my opinion, no mistake could be more grave and fatal than that of relinquishing this valuable right, which was the only important reservation made in the interest of China in the whole agreement. If China wants to get back the Railway, she must exercise her right to buy it at the specified time; otherwise she will not have the remotest chance of obtaining its possession in the future. The question, as I see it, admits no alternative; the only wise and necessary thing for China to do is to get the Railway back by all means.

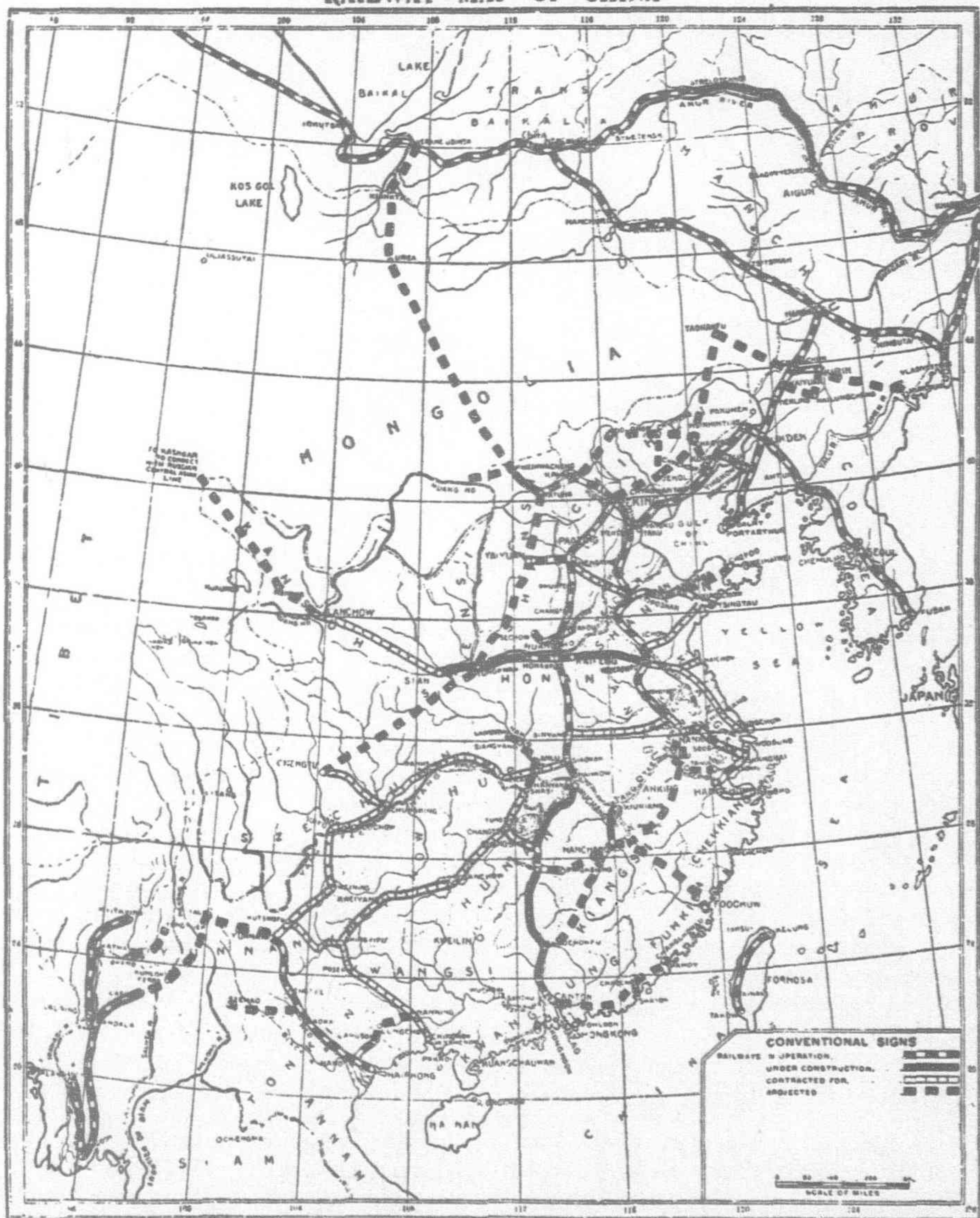
Russia's Recent Move

Recent developments tend to indicate that Russia, whose Far Eastern policy for the past 250 years has been that of the territorial and political aggrandizement at the expense of China, is making a renewed effort to strengthen her position in Mongolia and Manchuria. It is reported that the Soviet Government is making an arrangement with the Government of Outer Mongolia for the construction of a railway from Chita, Mongolia's capital, to Kulon, more than half way to Peking. This will enable Russia's coming into Peking independent of the Southern Manchurian branch of the Chinese Eastern Railway, which was ceded to Japan at the conclusion of the Russo-Japanese War. The agreement, as reported, provides for the same extensive privilege of buying and selling lands, of building houses and mining and felling timber within 100 versts of the railway, as well as the supreme control of the railway, as was concluded by the Czarist Government in the case of the Chinese Eastern Railway.

China Must Look Out

It seems clear that though Russia has changed her outward complexion since the

RAILWAY MAP OF CHINA



establishment of the present Soviet Government, her fundamental policy of political and economic aggrandizement remains the same. China must not be deceived into believing that Russia's recent demonstrations of seeming friendliness are actuated by her altruistic motives. Let our past experience with her be recalled. After the defeat of China by Japan in the Sino-Japanese War of 1895, Russia quickly lent China a helping hand by loaning her half the indemnity due Japan. What was her compensation for this "friendly act"? The vast railway and economic concessions in Manchuria which provided the real cause of the Russo-Japanese War of 1904-5! China must look out.

The Chinese Eastern Railway a Political Subterfuge

In order that this vital problem of redeeming the Railway may be more fully appreciated, it is necessary to point out further the importance of the Railway in international politics and its relationship to the welfare and peace of the Far East in both the past and the future.

Originally, the Chinese Eastern Railway was but a political subterfuge under which Russia sought to carry out her policy of political and territorial aggression in the Far East. It should be recalled that the project was launched by the Czarist Government with a definite view to gaining a foothold on the Pacific. The construction of the Trans-Siberian Railway marked the first step of her policy in this direction; the concession for building the Chinese Eastern Railway which she wrested from China constituted the sequence of her Far Eastern policy. The concession established for Russia a strategical position in Manchuria and on the Pacific Coast.

On account of the fact that Russia never had a seaport in Asia which was free from ice and open the year round, her desire of constructing a railway which could carry her to ice free ports on the Pacific was the more anxious. Her lease of Port Arthur and Dalny (Dairen) completed this chapter of the story.

The Role of the Chinese Eastern Railway

Now it is a recognized fact that Russia and Japan as powers are incompatible as far as their interests in the Far East are concerned. Two equally powerful states can seldom stay in peace while both competing for political and economic rights in the same place. One must go if the other is to stay. And in this case it is Japan who is to stay. She is compelled to do so by reason of the necessity of maintaining her national existence.

Russia, with her enormous wealth of natural resources and her immense population, will virtually force Japan into the sea should she once gain a stronghold in the Far East. Japan could not stand this. Hence the Russo-Japanese War of 1904-5. Nor will Japan stand Russia's dominance in the future. As long as Japan is able, she will do her utmost to prevent Russia from assuming a threatening position in the Far East.

In brief, Russia must keep out of the Far East; otherwise there will be another war in which China will again be the goat.

The Way Out

The successful prevention of such a war requires the eradication of its fundamental cause. Since Russia depends upon the Chinese Eastern Railway as her sole means of promoting her Far Eastern policy, the Railway is literally her main artery through which circulate her political ambitions. It constitutes the only link between Russia and the Far East. When the artery is cut off and when the link is broken, Russia as a menace in the Far East will cease to exist. Herein lies the political significance of redeeming the Railway by the Chinese Government.

As a matter of fact, why need Russia go beyond her own house to satisfy her political and economic ambitions? If she can effectively develop her vast natural resources and set her house in order, she will indeed be doing a service to mankind.

The Economic Aspects of the Question

Aside from the great political importance attached to the Railway there are paramount economic considerations calling for its being redeemed by China. Russia, through the Russo-Chinese Bank, secured outrageous economic concessions from China in

connection with the construction of the Chinese Eastern Railway. Under the pretext of securing necessary requirements for the construction of the Railway, she wrested from China rights for exploiting lands along the railway on a most extensive scale. She obtained exclusive rights to mine coal, to cut lumber, to operate telegraphic lines, and she even went so far as to run steamship lines in the Manchurian rivers. Prejudicing further the sovereign rights of China, she freely established self governing municipalities along the railway.

Manchuria a Land of Promise

Manchuria, especially the region served by the Chinese Eastern Railway, is in many respects the most valuable land in the world. Its varied topography and favorable climatic conditions make possible the extensive production of practically everything. Three main industries are, however, being developed. These are cattle breeding, farming and work connected with milling and lumbering.

The Agricultural Wealth

The center of the agricultural part of the country is Harbin. It is estimated that about 200,000 square miles are under cultivation. The soya bean, cultivated on about 5,000,000 acres, is a source of enormous wealth. Other important agricultural products consist of wheat, millet, buckwheat and flax. The development in the agricultural activities has been rapid. For instance, the amount of cereals transported by the Chinese Eastern Railway was in 1903 only 125,000 tons, in 1922 it was 1,900,000 tons.

The Forest Riches

There are three principal forest areas in North Manchuria. They are the Khingan forest, the Sungari forest, and the third is that existing between the ploughed plains along the Chinese Eastern Railway. These forests have a large reserve of timber which is essential to the development of industry. Data compiled by Chinese officials give the reserve of timber in Kirin province, south of the Chinese Eastern Railway, as 1½ milliard cubic feet; that in Khingan, 122 milliard cubic feet. Although the forest along the Railway has been extensively exploited, it is estimated that there are still 450,000,000 cubic feet of timber standing. The richness of this large reserve of timber is unimaginable.

Large Stock of Animals

The Chinese Eastern Railway zone is well stocked with farm animals, the chief of which are sheep, hogs, large-horned cattle, and horses. It is estimated that the district has 10,000,000 sheep, 5,000,000 cattle of large-horned type, 3,000,000 hogs, and about 3,000,000 horses.

Manchuria Offers Outlet for Population

Manchuria with an area of 400,000 square miles and a population estimated at 20,000,000 permits extensive colonizations. This part of the country furnishes an outlet for a large number of people in many too much congested parts of China. Hence, the restoration of the complete rights in Manchuria and Mongolia, through the redemption of the Chinese Eastern Railway, is not only of great political and economic importance, but also of great social import.

Redemption Involves Two Questions

The problem of redemption involves two main questions: (1) the valuation of the Railway, i.e. appraising the cost of the Railway which shall be paid by China to the Russo-Asiatic Bank; (2) financial preparation and arrangements whereby funds are to be obtained for redeeming the Railway.

Valuation of the Railway

The whole Chinese Eastern Railway connecting the Trans-Siberian line with Vladivostok across Manchuria and the south from Harbin to Port Arthur is about 1,600 miles in length. After the Russo-Japanese War, the Southern Manchurian branch of

the Railway, from Kwangchengtze, or Chang Chun, to Port Arthur was surrendered to Japan. The Chinese Eastern Railway system, as it now stands, has a total length of about 1,070 miles. It is to be presumed that the section of the Railway transferred to Japan shall revert to China at the time the entire Railway is to be redeemed, upon payment to Japan of any investments she has expended in this branch of the railway. Under no circumstance, however, should China be called upon to pay twice for the value of the line extending from Kwangchengtze to Port Arthur. If China pays the Russo-Asiatic Bank the price covering the whole system of 1,600 miles, any claims Japan has should be settled between Japan and the Russo-Asiatic Bank.

The First Basis of Valuation

There are two avenues of approach in establishing the purchase price of the Chinese Eastern Railway to be paid by the Chinese Government. The first basis is found in Section 30 of the Agreement defining the Statutes of the Chinese Eastern Railway Company which reads :

"On the expiration of thirty-six years from the time of completion of the whole line and its opening for traffic, the Chinese Government has the right of acquiring the line, on refunding to the Company in full all the outlays made on it, and on payment for everything done for the requirements of the Railway, such payments to be made with accrued interest. It follows as a matter of course that the portion of the share capital which has been amortized by drawings and the part of the debt owing to the Russian Government under guarantee and repaid out of net profit will not constitute part of the purchase money. . . ."

This means that the purchase price will be approximately the aggregate of the share capital and the bond capital outstanding at the time of redemption, since it was provided that any sum remaining in the reserve capital account at that time becomes the property of the shareholders.

The Second Basis of Valuation

The second basis is found in a documentary letter addressed to the Chinese Minister by the representative of the Russo-Chinese Bank, under the date of September 2, 1896, a part of which letter reads as follows :

" . . . The accounts of the Railway to be constructed will be made up annually and will be published officially. This report will present the status of the several accounts, the receipts and expenses for operation and also the service of debts, loans, etc. The eventual repurchase would be effected on the basis of these balances as published annually."

If records showing the status of the accounts here referred to are complete, the price at which China shall redeem the Railway can be easily determined.

Rough Estimates

It was estimated that the total cost of construction for the whole system was about Rubles 422,292,000. This would amount to about 400,000,000 silver dollars at the rate of approximately one dollar silver to one ruble. It may well be presumed that a considerable part of the amount has been amortized from time to time, so that the actual cost is at present much below 400,000,000 dollars. In the absence of concrete data on which a conclusion as to the actual cost of the Railway can be based, some rough estimate can be gotten through a comparison of the capitalized mileage value of some of the Chinese Government Railways.

The following is a comparison showing the cost per mile of line of some of the Chinese Government Railways for the year 1923 :

Name	Total Mileage	Total Cost of Road and Equipments	Cost Per Mile
Peking-Hankow	825	\$120,968,000	\$146,600
Peking-Mukden	605	94,263,000	155,800
Tientsin-Pukow	687	118,999,000	173,200
Shanghai-Nanking	203	32,960,000	123,000
Taokow-Chinghua	110	8,351,000	75,900

Name	Total Mileage	Total Cost of Road and Equipments	Cost Per Mile
Hupei-Hunan	260	59,396,000	228,400
Peking-Suiyuan	550	56,174,000	102,100
All Government Railways	4,267	629,074,000	147,400

From the table it is seen that the Hupei-Hunan line has the highest capitalized value per mile of line, amounting to \$228,400 ; the Taokow-Chinghua Railway has the lowest value, amounting to \$75,900, and the average for all the government railways, \$147,400.

By reason of its location and the character of its traffic, the Peking-Mukden Railway would perhaps come nearer the true value of the Chinese Eastern Railway. On the basis of the capitalized value of \$155,800 per mile of the Peking-Mukden line, the entire system of the Chinese Eastern Railway of 1600 miles would have a capitalized value of \$249,280,000 which, I believe, is not far from the truth. On the basis of the lowest capitalized value of \$75,900 per mile of the Taokow-Chinghua line, the whole Chinese Eastern Railway would have a capitalized value of \$121,440,000, which may be below the actual cost. On the basis of the Hupei-Hunan line of \$228,400 per mile, the total capitalized value would be \$365,440,000. This last figure would of course represent the maximum valuation, and I believe it is much too high.

Financial Preparations Necessary

Although a definite figure cannot be established at present which would represent the total cost of the Railway to be paid by the Chinese Government in the time of redemption, it may well be presumed that the purchase would involve hundreds of millions of dollars. It is a great financial transaction. In order to insure its success, China must be prepared.

Government Finance Seems Hopeless at Present

Just now China is in such financial muddle that many simply cannot conceive how she can extract herself from the deep mire. Indeed, since the beginning of the Republic, China has been continuously sailing in precarious financial straits. Government expenditures exceed its actual revenues. Demands for funds from the different departments of the Government become more urgent day by day. She lives practically from hand to mouth. In all appearance, her financial situation is hopeless.

Real Situation Not So Bad

When the problem is analyzed, however, the situation is not so bad as it appears. As a matter of fact, the Chinese Government finance is an extremely easy problem. A complete financial rehabilitation could be accomplished, if an opportunity is given to men of broad financial knowledge and ability to work out the problem, with the support of the entire nation.

The immense country with a population of 400,000,000 and the vast natural resources has the least financial burdens in the world, as far as the national debt is concerned. At the present, the public debt of China, both domestic and foreign (exclusive of railway debts) does not exceed 2,000,000,000 dollars. This gives a per capita ratio of approximately \$5, which is insignificant when compared with the per capita ratio of \$1,400 in Great Britain ; \$1,300 in France ; \$400 in the United States (Federal only) ; \$300 in Belgium ; \$190 in Italy, and \$50 in Japan.

Need of Restoring National Credit

Nevertheless, it has to be admitted that China is experiencing some financial difficulties at present, and her national credit has been in the decline. As a first step to financial reconstruction of China, I suggest the complete restoration of the national credit, which is a pre-requisite to making any successful financial arrangements for redeeming the Chinese Eastern Railway, and, in fact, to making any constructive programs that call for financial involvement on a large scale.

Settlement of Unsecured Indebtedness

At present there are outstanding unsecured domestic and foreign loans and various advances to the Chinese Government

amounting to, including interest, approximately \$600,000,000. A large portion of these loans has been defaulted in their interest payments and in many instances their principals are overdue. As long as these obligations are not met, the national credit of China will remain below par. It is then of paramount importance that these unsecured loans be properly settled first, either by making payments promptly when due or by refunding them into a secured issue.

In a statement delivered by members of the Financial Reorganization Conference, of which Mr. Liang Shih-yi is the chairman, five major points were set forth for special consideration in connection with their work. They are: (1) a clear demarkation regarding the power of the Central Government and that of the provinces, with the view to drawing a dividing line between the revenue of the Central Government and that of the provinces; (2) the budgetary control of the finances of the Central Government and the provinces; (3) improving the economic conditions of the people through reforms such as the abolition of the *likin* and the revision of tariff rates; (4) settlement of the present unsecured debts; (5) reform of the present military system with a view to cutting down the enormous military expenses amounting to 50 per cent. of the nation's revenues. I believe these points afford a sound working basis on which a financial rehabilitation can be achieved.

Where the Tariff Conference Comes in

The present Peking Tariff Conference to provide for an increase of tariff rates from 5 per cent. to $7\frac{1}{2}$ per cent. and more and to consider the question of tariff autonomy comes into the picture at this most opportune moment of financial reconstruction. When the increase is effected, a $2\frac{1}{2}$ per cent. increase alone would, based on the 1924 figure of \$105,000,000 net customs revenues (70,000,000 Haikwan Taels at \$1.50) bring in an additional revenue of \$35,000,000. The sum of these amounts, i.e. \$140,000,000 plus the yearly increase of revenues due to natural growth of trade averaging \$3,000,000 would raise the total revenues for 1926 to approximately \$143,000,000. After deducting loan services of \$90,500,000 in 1926 secured by the customs revenues, there would leave a surplus of \$52,500,000. The amount of the annual surplus revenues will increase from year to year as the customs revenues grow simultaneously as a result of annual growth of trade and the gradual reduction of loan services charges against the customs revenues. This revenue surplus would afford an ideal basis for a new issue of bonds to the extent of \$700,000,000 for refunding the unsecured loans. It seems to me that to nowhere else can the increased tariff revenues be better applied than to the use above referred to, as a preliminary step to restoring the national credit. When the tariff autonomy shall have been restored to China, revenues from this source will increase many-fold and additional loans may be floated to secure funds for other useful and constructive purposes.

The Redemption Machinery

When the way for financing this important transaction, namely, the redemption of the Railway, is paved through the restoration of national credit, what needs to be done next is to set up a proper machinery to handle the work connecting therewith. Such machinery may take the form of a specially appointed and duly authorized commission, with sub-commissions under it. The commission should include men of financial, engineering and legal knowledge to look after the various phases of the transaction, either jointly or separately. Probably, it would be advisable to include one having experience in the publicity field to assume the work of informing the public as well as creating sentiments in this important project. The commissions with the aid of technical experts whom it may see fit to employ should be charged with the whole responsibility of getting back the Railway.

Two Main Tasks of the Commission

There are two main tasks the commission must assume. They are, first, the proper valuation of the Railway and, second, the financing of the purchase. With reference to the first problem,

much has been said in the earlier sections of this paper. However, if it is necessary to establish some arbitrary figure for the purchase price of the Railway to be paid by China, that figure should be arrived at scientifically.

There are two general methods by which the value of a railway can be approximated, namely, the physical valuation and the commercial valuation. Commercial valuation is obtained by applying the market value of securities which they possess to the volume of securities outstanding. In brief, it means an investigation based upon market prices of the railway securities. Physical valuation, on the other hand, involves four schemes or processes: (1) original or actual cost of construction; (2) reproduction cost, new; (3) present value—replacement cost less depreciation; (4) market value based upon earning power. It is not necessary here to enter into a discussion of the merits and limitations of the two general methods or of the different schemes under which physical valuation may be based. Should occasion demand a valuation on the basis of one of these methods or processes, that based upon the market value obtained by capitalizing the earnings of the Railway would be the most equitable in this case. In this connection, it should be remembered that the book value covering the cost of properties seldom represents anything even approximating the facts. It may well be presumed that the book value, in the case of the Chinese Eastern Railway Company, had been exaggerated far beyond the truth.

Considerations of a Financial Plan

With respect to the second point, namely, the formulation of a financial plan whereby funds are to be secured to pay the purchase price, the work involves a number of considerations. Foremost of the considerations are: (1) the financial plan, in whichever form it may assume, must inspire the highest degree of confidence among the investors and incorporate all possible safeguards for the investment public; (2) the plan must be workable. Any successful financial plan must embody these two fundamental principles. One without the other results in failure; they are the irreducible elements in the formulation of a successful financial plan.

The Human Factor

Before presenting definite financial plans, I beg to indulge a few words on the importance of human factor in connection with redeeming the Railway. I believe in a colossal undertaking such as this, public sentiments are highly essential. The public not only should be thoroughly informed, but also should be perfectly convinced of the importance of the issue. More than this, every citizen of China should be made to feel that he owes a duty toward his country. He should be led voluntarily to subscribe to the cause with all he has. In brief, this colossal work must enlist the support of everyone and all.

I have strong reason to believe that the Chinese people are red-blooded. I believe they are patriotic. There will be thousands, nay, hundreds of thousands who will want to contribute most generously to the cause. There will be as many making heavy sacrifices for the consummation of this work. But just because of the great confidence on the part of the people, there is the imperative necessity of providing all the possible assurance of success in the financial plan to meet their aspirations. This means that the principals of their investments must be safeguarded and that a fair return be guaranteed to them. I strongly urge that the whole work be administered with one hundred per cent. honesty.

The Financial Plan

The financial plan which I would suggest for the purchase of the Chinese Eastern Railway will consist of two parts: (1) the pre-redemption financial preparations involving the issuance of securities in anticipation of the purchase; (2) post-redemption financial adjustments involving matters such as the rebonding of the Railway and securing of funds to make necessary changes and improvements to place the Railway on an efficient basis.

I deem the first part of the plan necessary, because it fills several distinct needs. In the first place, I believe that a task of this magnitude and importance calls for adequate financial preparations well in advance. It is unfortunate that the Chinese, like many

others, are often known as those who resort to embracing Buddha's feet in the face of calamities. This lack of preparedness is generally due to their failure to appreciate the importance of issues they must face. In the second place, I believe that any plan, when once set into motion, will help overcome the inertia that always blocks the way of a great movement, and that may otherwise prove ruinous if it has not been properly reckoned with. Finally, I believe that action brings before the eyes of the public the reality of the issue, which is of great psychological importance.

The Pre-redemption Financial Plan

My suggestion favors the issuance of the Chinese Eastern Railway purchase money bonds by the Chinese Government, to embody the following points:

1. The total authorized issue shall be \$400,000,000 to be divided into four series of \$100,000,000 each. As loans authorized hereunder are floated, the first issue shall be known as "The Chinese Government Chinese Eastern Railway Purchase Money Loan, Series No. 1"; the second issue, as "The Chinese Government Chinese Eastern Railway Purchase Money Loan, Series No. 2," etc.

The total authorized issue may be put out at once, or at different times in one or more series. In case any one or all of the series shall be issued in a foreign market or foreign markets and in foreign money, the amount so issued shall be equivalent to the exchange value of the authorized amount in silver dollars.

The terms of issue, such as the rate of interest, the time of payment, the time of maturity, etc., shall be determined later in accordance with market conditions and other considerations.

2. The proceeds of the loans shall be used (1) for defraying expenses incurred in connection with the purchase, (2) for the payment of the purchase price of the Railway, (3) for proper investment in the Railway after the purchase, should there be any surplus left over after the proceeds have been applied to items (1) and (2). Under no circumstances shall any portion of the proceeds be diverted to other channels than mentioned above.

3. Payments for bonds may be made in bonds of the Chinese Eastern Railway issued either by the Chinese Eastern Railway Company or by the Russo-Asiatic Bank on account of the Railway. Such payments shall be based upon exchange ratios to be determined later.

4. Bonds issued hereunder shall be convertible into a later issue or issues of the Chinese Eastern Railway after the purchase by the Chinese Government. Bonds not converted prior to a certain fixed date shall be subject to call, in part or in full, at a price to be determined later.

5. The bonds shall be direct obligations of the Chinese Government, if necessary, to be specifically secured by definite assets or revenues.

6. Bonds of denominations of both small amounts and large amounts shall be issued to facilitate the purchase by all classes of investors. When the issue is put out in China, bonds of denominations of \$5, \$10, \$50, \$100, \$500, and \$1,000 may be issued to advantage.

The Post-redemption Financial Plan

The post-redemption financial plan involves a refunding mortgage issue, or issues, for a similar or greater amount, the purposes of which shall be:

1. To refund the Chinese Government Chinese Eastern Railway Purchase Money bonds;

2. To make necessary improvements to put the Railway on an efficient basis, both in physical properties and in the organization and management of the Railway;

3. To pay for the change in the gauge of the Railway which is now in the Russian gauge.

I deem it highly advisable to refund the purchase money issue for the reason that by bonding the Railway upon a mortgage of its physical properties, not only the Chinese Government can be released of this tremendous financial obligation, which the Railway should rightly assume, but the finances of the Railway can be greatly simplified by concentrating all funded indebtedness on one or more issues.

In the original agreement between China and Russia relating to the construction and operation of the Railway, it was specially provided that the gauge of the line should be same as that of the Russian railways (5 Russian feet or about four feet, two and one-half inches, Chinese). For both political and commercial reasons, this gauge should be changed to the Chinese railway standard gauge, which is four feet, eight and one-half inches.

The principal of the loan shall be secured by a first mortgage on the Railway, and interest, by its earnings. If occasion demands, the Chinese Government should guarantee both the principal and interest of the loan, with certain specified assets or revenues.

Minor details relating to the rate of interest, the time of payment, the date of maturity, the denominations, etc., are to be determined afterwards in the light of market conditions and the temper of the investment public. It should be emphasized, however, that every possible means should be provided for the protection of the investors and for the nation-wide participation in the issue.

Conclusion—The Importance of Issue Re-emphasized

In conclusion, I wish once more to emphasize the extreme importance of the issue. I have shown that the Chinese Eastern Railway holds the keynote to the vital problem of peace or war in the Far East in the future as well as in the past. I have indicated the political aspects of the Railway and its relationship to the interest of China, Japan and Russia. Finally, I have related the vast social and economic significance attached to the Railway.

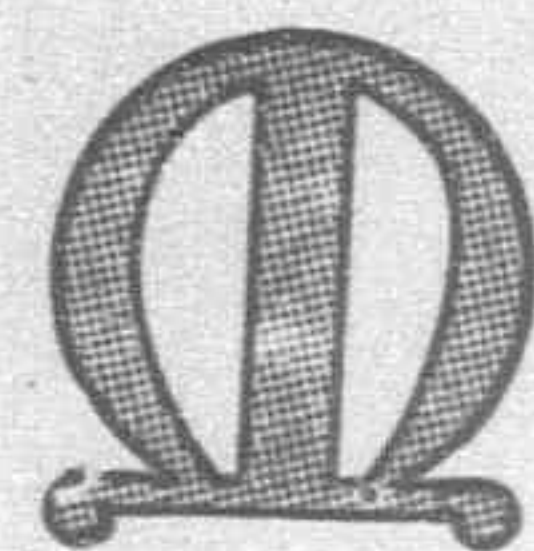
For all these, China must restore this Railway. She should do so even if she has to make great sacrifices.

Recently, there have been various indications of Russia's activities aiming at the control of the Railway beyond the redemption period. One of her baits offered to China for relinquishing the option of purchase is found in Article 1, Section 13, of the Mukden Agreement, September 20, 1924, between Manchuria and the Soviet providing that the concession period of eighty years mentioned in Article 12 of the Contract of September 8, 1896, for the construction of the Chinese Eastern Railway, shall be reduced to 60 years upon the expiration of which the line with all its appurtenances will pass free of charge to the Chinese Government. She further offered to reduce the afore-mentioned period of 60 years, this question to be taken up for consideration with the approval of the two Contracting Parties. I deem it my duty to point out the folly of China in even fancying on an inducement of this sort. It would not only accrue no benefit to China, but may cause the Railway to be lost to her when the Red bear becomes too strong and fierce to submit to reasons. According to certain railway experts well informed in the condition of the Railway, it can be made to pay the price of the entire in a period of five years. Therefore, what benefit can China get even if the concession of the Railway were reduced to 50 years, instead of 60 years?

Success Depends upon World Confidence

The success of this stupendous work much depends upon the confidence the world has in the Chinese Government. The whole nation would stand solidly behind the Government if they believe the central authorities to be sincere to their purposes and honest in their administration. I think that in no other period is the virtue of sincere and honest government more needed than the present when the nation is undergoing political and financial reforms. The world would be sympathetic toward China and generous in their support if they believe that the Chinese Government is capable of carrying responsibilities and obligations it must assume. While China has every reason to work for the restitution of her alienated rights granted under duress or otherwise and to make reforms of any sort, I favor that China follows a procedure that is in accord with the best practices of international relations, a procedure that is evolutionary and reasonable, not revolutionary and violent. I believe that the time is over when self-interests and intrigues alone dominated the international dealings. They are slowly, but surely, being supplanted by altruism and mutual helpfulness. And the nations of the world are more and more looked upon as members of a big family. I believe that the rest of the world will do their part if China will live up to her obligations. The spirit which permeates the Peking Tariff Conference, which has accepted the principle of China's tariff autonomy effective in 1929, bears a direct proof of my observation.

The Economic Resources of Manchuria



MANCHURIA, comprising the provinces of Fengtien, Kirin and Heilungkiang, with a total area of 363,700 sq. miles, is growing in importance from year to year, both politically and economically. Its rich resources, which are being rapidly developed through its close contract with the outside world by the South Manchuria and the Chinese Eastern Railways, supply the means for building up a self-supporting realm within its own borders. For these purely economic reasons, as well as for its political importance, the region has now attracted the attention of the world.

I. Agriculture

Generally speaking, the territory lies between 40 and 50 North Latitude. This fact combined with its proximity to the sea gives the land a temperate climate suitable for all agricultural pursuits. With the exception of a few principal ranges bordering its frontiers, the territory is composed of extensive plains covered with rich loamy soil. With a total population of less than 15,000,000, or about 40 per sq. mile, it is the most sparsely settled among China's provinces. It is the only region in China where agriculture is successfully practiced on a large scale.

The principal agricultural land may be roughly divided into four main sections: (1) the south-eastern section, taking in the basin of the Yalu River and its tributaries. This is at present the richest and best developed. (2) the northern section, extending from the crossing point of the Sungari River with the Nunkiang eastward to Mao-Tan Kiang and including the great plain of Kirin. This is only partially opened up. (3) the south western section, comprising the Liao river valley and all the fertile regions irrigated by the Ta-Tse-Ho and the Hung-Ho, which are tributaries of the Liao. This area is being rapidly developed and promises to be the future granary of Manchuria. (4) the southern section, covering 68,000,000 mow of arable land of which only 5,000,000 mow are under cultivation.

The native Manchurians are originally pastoral in habit, but the new settlers, who are responsible for recent developments, are fast changing the entire region into cultivated fields. Out of the numerous extensive tracts of pasture land, only a few remain intact, the most noted of which are those along the Sungari River extending from Sansing, Kirin, to Paiyangmu, Heilungkiang, for 200 li, those lying between Hulan, Heilungkiang, and Tsitsihar for a distance of 500-li, and those in the neighborhood of Hailar, Heilungkiang.

The principal crops may be enumerated as follows:

Leguminoase, known locally as "Yellow bean" or "Round bean" and comprising four principal varieties, i.e., the "Golden round," the "Golden yellow," the "White eye-brow" and the "Black belly," is the most important commercial crop. It is exported in enormous quantities in the form of bean cake and bean oil. A large quantity is also consumed in the province itself as human and animal food. It also constitutes an essential element in crop rotation as a nitrogen fixer for enriching the soil.

Phaseolus mungo, locally known as "Green bean" and whose use is similar to that of the soya bean, is largely produced in the south-eastern section.

Glycine hispida, used for stock feed and making sauce. It has the lowest oil content among all the beans.

Other leguminous crops are all more or less cultivated by Manchurian farmers either for human or animal food. Among the cereals are wheat, barley, rice, millet, oats, corn, kaoliang and coix lacryma, while rapeseed, flax, tobacco, linseed and melons are the most important among the miscellaneous crops.

In the absence of statistics, it is difficult to estimate the total yield. The following figures compiled from different sources, including the result of an investigation made by the Japanese authorities in 1922, serve to indicate the relative importance of the various crops.

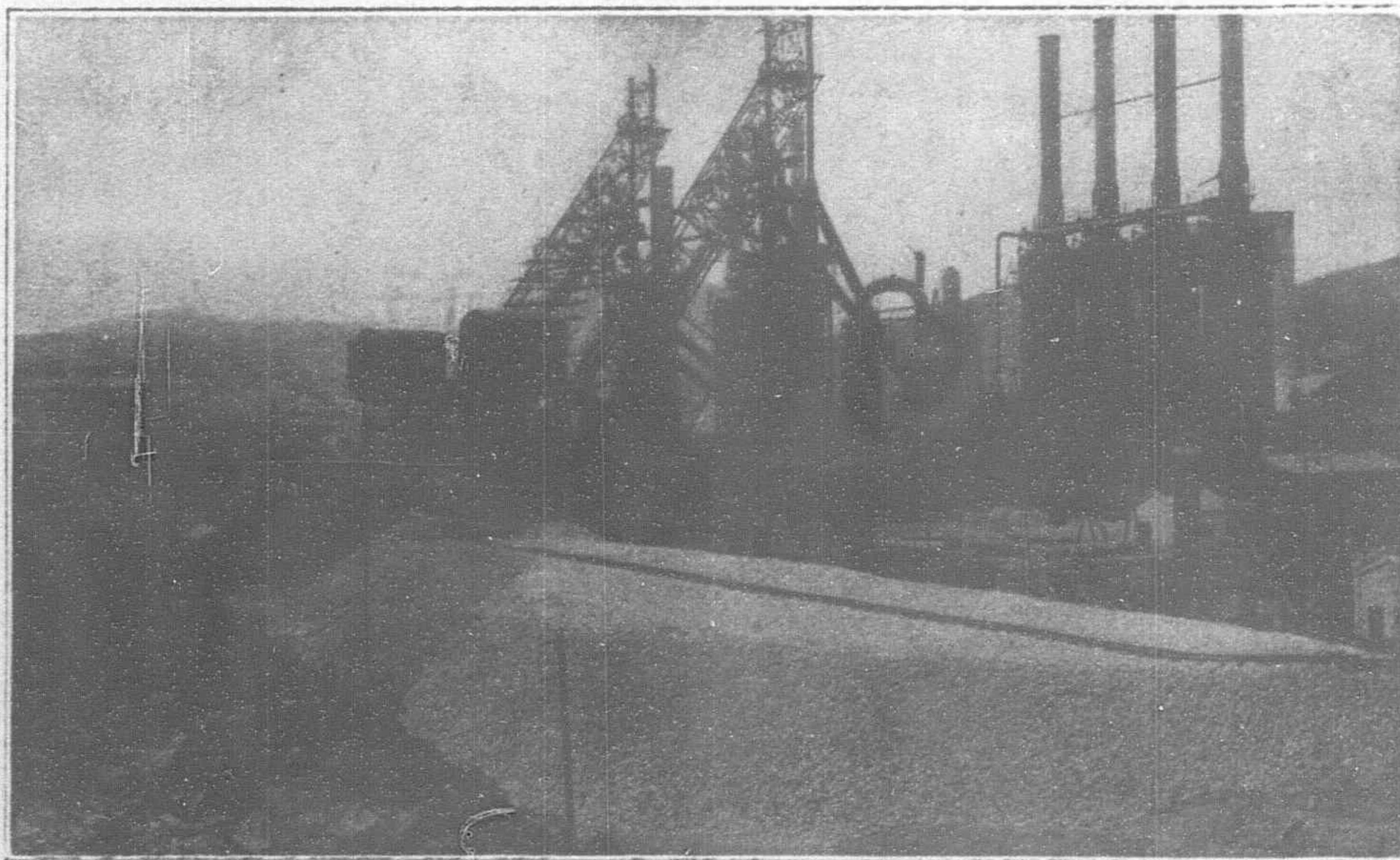
Name of crop	Area Under Cultivation (Mow)			
	Fengtien	Kirin	Heilungkiang	Total
Rice (lowland) ...	3,754,920	1,453,500	—	5,208,420
Rice (upland) ...	3,260,400	1,671,120	800	4,932,320
Barley ...	5,650,740	6,189,480	11,690,560	23,530,780
Wheat ...	10,245,060	9,923,940	23,277,520	43,446,520
Oats ...	—	114,900	6,157,200	6,272,100
Beans ...	55,718,220	27,770,400	31,673,920	115,162,540
Kaoliang ...	36,510,600	45,118,200	13,028,320	94,657,120
Millet ...	53,895,600	28,639,200	5,568,000	88,102,800
Corn ...	30,697,200	28,329,240	18,145,640	77,172,080
Miscellaneous cereals	16,190,220	7,128,300	8,510,472	31,828,992
Total ...	215,922,960	156,338,280	118,052,432	490,313,672

Animal husbandry is well developed. Although there are only a few special stock farms, practically all households keep domestic animals, such as oxen, cows, ponies, mules, donkeys, camels, sheep, goats, pigs, ducks, chickens, geese, etc. There is no pure-bred stock to speak of, and the animals reared are by no means of very high grade, but are usually hardy and docile, and well adapted to the loose management and comparatively coarse food prevalent in these regions. The following particulars serve to give a general idea of the sort of animal found on the Manchurian farm.

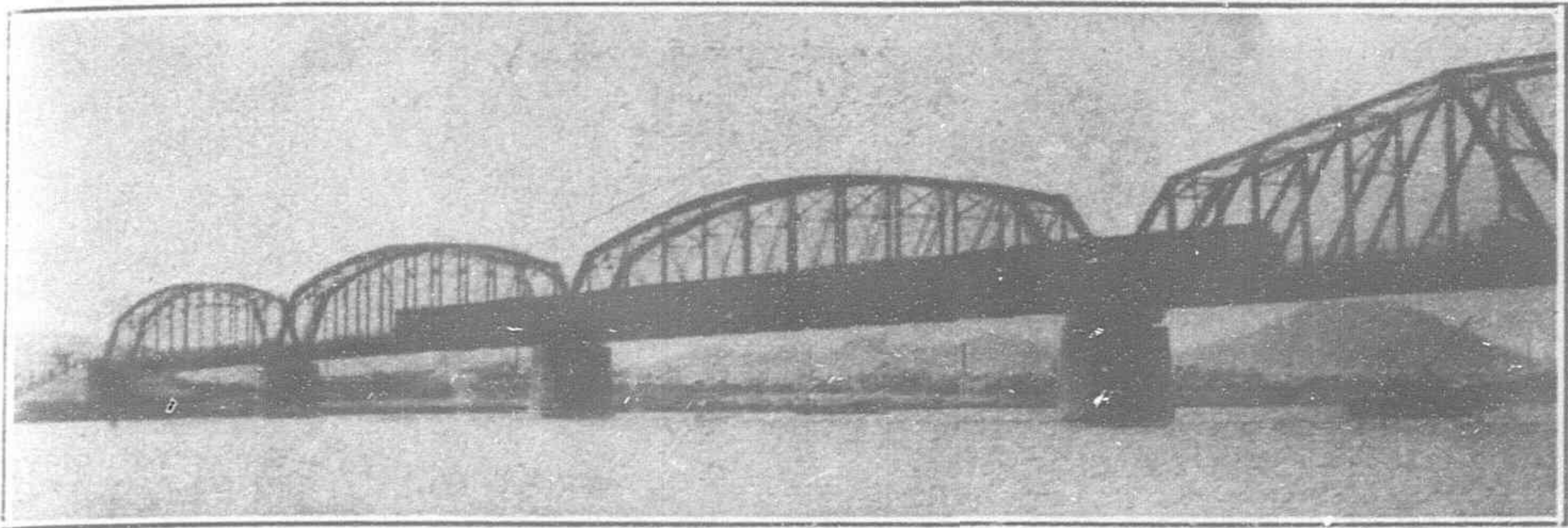
The *ponies* are of Mongolian origin, rather small in stature but possessing much endurance. They stand about 13 hands, and are about 420 catties in weight. An average pony will carry a packload of about 200 catties and travel 80 to 100 li a day. A large cart weighing 1,000 catties with a 2,000-4,000 catty load requires 6 to 10 ponies, while a small cart of 500 catties clear weight and carrying a 1,000-2,000 catty load requires 3 to 6 ponies, moving about 80 li per day in both cases. For riding purposes, specially trained pacing ponies are generally used, capable of travelling 100 to 150 li a day at an easy gait.

The *donkeys* are much smaller than the ponies, and are capable of carrying about 50 catties for 80 li a day. They are highly favored for light farm work and short distance traveling on account of their economical rations and amenableness to handling.

The *mules* are usually a little larger than the ponies, are better pack animals, and have a greater carrying capacity (a full load being about 300 catties) and greater endurance. They can also subsist on less and coarser food, requiring about two-thirds of a pony's rations.



A View of the Iron Foundry, Penshihu



The Iron Bridge at Antung

The *cattle* are either of Shantung or Korean breed, about 3 feet 9 inches in height, 4 feet 6 inches in length, and 5 feet 8 inches round the girth. They are chiefly employed for field plowing and cart pulling, there being no special meat breed. A large ox cart drawn by 2 or 3 oxen with a load of 600 to 800 catties will travel 50 to 60 li a day, while a small cart with a 200-400 catty load may be pulled by one ox. Cows are also kept for their milk. They are killed for their meat when too old or too feeble to work. A 500 catty steer will yield about 200 catties of clear meat.

The *camels* are mostly of the double hump breed, 5-6 feet in in height, and weighting slightly above 500 catties. They are admirably adapted to the cold and dry climate. Each camel is capable of carrying a pack load of 400-600 catties and can travel 150 li a day. Aside from its value as a pack animal, about 4 to 5 catties of wool may be shorn from each camel annually.

Sheep and goats are kept mainly for meat purposes, with their wool as a by-product. There are more goats kept on Manchurian farms than sheep, as the former are considered more economical as meat animals and thrive better in a rigorous climate. Each goat weights about 50 to 80 catties and produces about two catties of wool yearly, the wool is of rather inferior quality and is largely exported to Japan and the United States for weaving cheap cloth. These animals constitute the principal asset of the Mongolians residing in Manchuria. The Mongolians used to count their possessions in terms of these animals, and still barter them for other goods they need.

Hogs are reared by Manchurian farmers to consume the waste food material of the farm. In the cities, where bean curd and wine are manufactured, many hogs are also kept for the same purpose. The pork is all consumed locally, but bristles form an important article of export, chiefly to Japan. The annual production of bristles averages 1,500,000 lb., sold at about \$5.00 per lb. A full grown hog (two years old) weights on the average about 250 catties. They are very prolific; each brood may have a litter of about a dozen. The breed is one that fattens very easily and is capable of withstanding a good deal of hardship.

Domestic fowls such as chickens, ducks and geese are also kept in large numbers, but rarely in large flocks. Nearly every farmer keeps a few around the farmyard for both their meat and eggs. The export of eggs has grown tremendously in recent years.

The production of *wild silk*, another recently developed industry, has also attained considerable proportions. In fact, Manchuria leads all other provinces at present in this field. Antung, on the Korean border, Fenghwangchen, Kwantien, Haichen, Kaiping, Siuyen and Fuchow are the centers of production, while the regions around Changpaishan in Kirin, are also fast developing along this line. The annual export of silk and cocoons within the last few years averages over \$10,000,000. Although compiled in 1918, the following figures from Chinese Government reports and Japanese sources give some indication of the number of animals kept on Manchurian farms :

Kind of animal	Fengtien	Kirin	Heilungkiang	Total
Ponies ...	788,149	716,008	905,977	2,410,134
Donkeys ...	340,022	184,060	41,523	565,605
Cattle ...	474,796	495,645	298,973	1,269,414
Sheep and goats ...	652,659	184,423	226,660	1,063,742
Hogs ...	5,569,643	1,241,482	1,219,400	8,030,525
Chickens ...	6,149,976	3,764,687	1,815,856	11,721,519
Geese ...	875,240	827,824	313,359	2,016,423
Ducks ...	220,202	64,427	73,843	358,472
Mules ...	205,330	231,374	115,314	552,018
Camels ...	—	—	58,000	58,000

II. Forestry

Forest areas are better preserved in northern Manchuria than in the south. The best known forests are found in the Changpaishan Range, the Hingan Range and along the Yalu, Sungari and Tumen Rivers. Generally speaking, the more accessible locations along the lower portion of these rivers have already been more or less cleared of their virgin timber, but as one goes further up towards the source of these rivers, extensive virgin forests still remain untouched. In the old Manchu days, large forest areas in the heart of Kirin were set apart as imperial hunting reserves, but since the opening

of these areas for settlement, much of the timber growth has been cleared, only occasional groves being left uncut at present. Deep in the mountain ranges along the Chinese Eastern Railway, however, there are still virgin forests free from human exploitation. With the meagre data available at present, it is well nigh impossible even to make a rough estimate of the extent of existing forests. But the following figures extracted from Chinese Government reports and checked with those obtained from Japanese sources will give the reader a general idea of prevailing conditions :

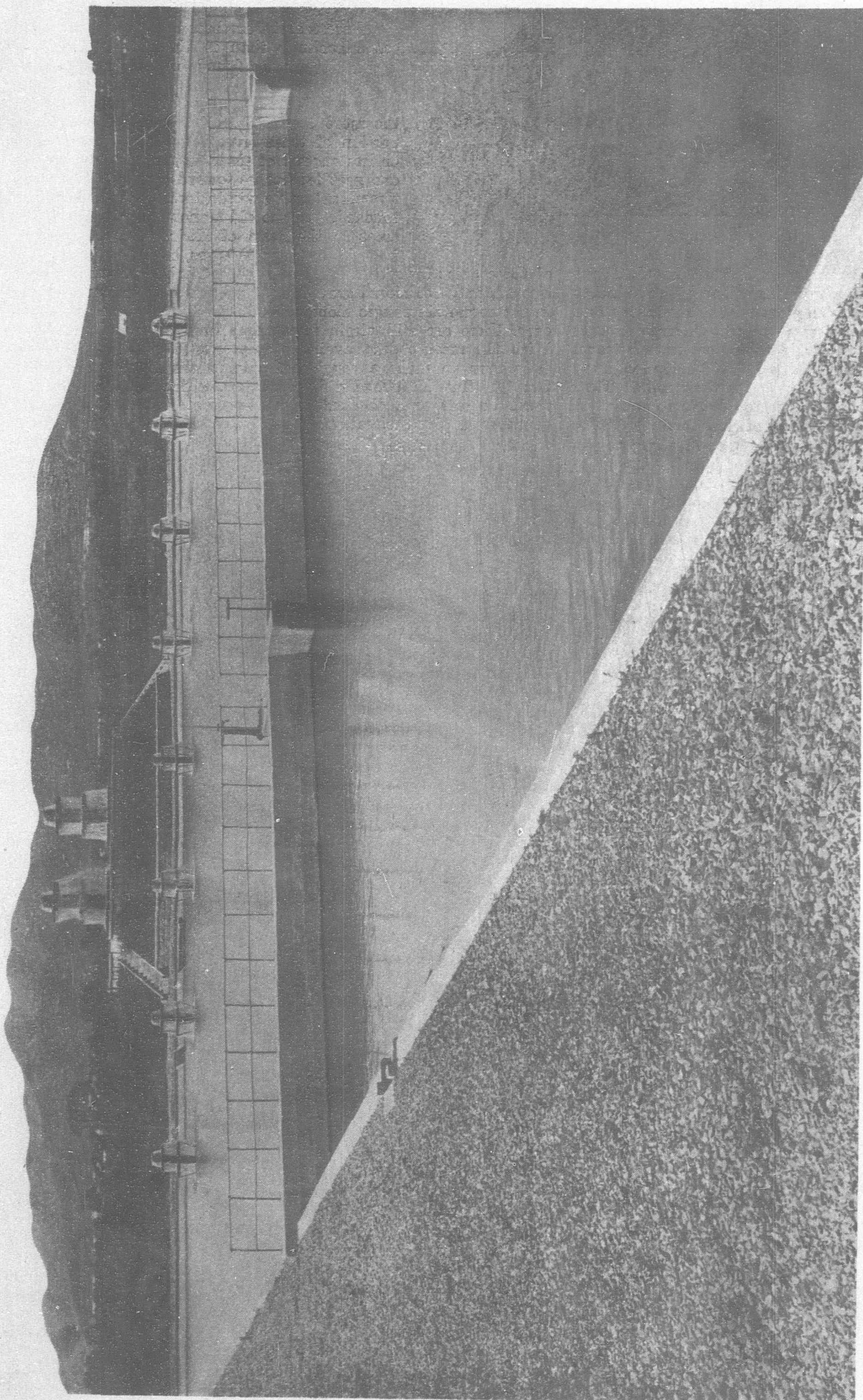
Yalu River Valley and Hung Ho Valley ..	7,688,000	mow
Upper Sungari and Mutankiang Valley ..	31,424,000	„
Mountains along Chinese Eastern Railway	123,616,000	„
Great Hingan Range	9,808,000	„
Total	172,536,000	„

According to unofficial estimates, the total forest area in Manchuria is only 80,284,536 mow. Most of the Manchurian forests consist of virgin growths, and the varieties present are most irregular and numerous. Over 300 kinds of timber materials have been identified, of which eight varieties of needle leafed trees and 17 varieties of broad-leafed trees are most valuable for logging. These are all grown together with no definite line of demarcation. It is generally estimated that about 40 per cent consist of needle-leafed and 60 per cent. of broad-leafed trees. Owing to the comparatively shorter growing season, it takes a longer period for a tree to attain a certain size in Manchuria than in other provinces. Among the needle-leafed trees, the following species may be mentioned as being the most important economically.

- (1) "Red pine," often reaching 80 to 100 feet in height and 13 feet in circumference. Its wood is characterised by its fine grain and lustrous appearance, being strong but soft, and well adapted for construction and structural purposes.
- (2) "Fish scale pine," often reaching 100 feet in height and about 10 feet in circumference, is a reddish-yellow wood of fine grain and lustrous appearance. It easily expands and contracts under varying weather conditions; hence, is easily cracked. It is used generally for making boxes and cheap flooring.
- (3) "White pine," height 80 feet, circumference 7-8 feet. Its wood is light, soft and elastic, and commonly used for making frame work and household utensils.
- (4) "Sandy pine," white wood with reddish core, particularly rich in resin. Height 70-80 feet, circumference, 7-8 feet.
- (5) "Yellow flower pine," height 100 feet, circumference 10-12 feet. Its wood is hard, durable and moisture resisting, particularly suited for bridge work, masts and general structural purposes.
- (6) "Oily pine" similar to the "Yellow flower pine"; only its wood has an oily appearance and is rich in resin content.
- (7) "Red cedar," about 30 feet in height and 3-4 feet in circumference. Reddish wood of fine grain and exceedingly elastic, being commonly used in making elaborate carved woodwork.
- (8) "Pun pine" 40 to 50 feet in height and 2 feet in circumference, is a yellow wood, resistant to water, and used for boat-building and making ornaments.

Among the broad-leafed varieties, the following are commercially important :

- (1) Willow of varied height, circumference often reaching 5-6 feet, white wood with a yellowish tint, rather coarse in grain, hard, heavy and durable, used for ship-building, making agricultural implements, cart wheels and railways sleepers.



The Dairen Waterworks

(2) Mountain elm, reaching 60 feet in height and 6 feet in circumference. Its wood is very closely grained and hard to break, and is used for making axe handles, cart axles, household utensils and furniture.

(3) Red elm or rosewood, 60 feet in height and 5-6 feet in circumference. Its wood is similar to the "mountain elm" but harder, and used for making cart axles and other parts of vehicles and building requiring great tensile strength.

(4) Walnut, 50 feet in height and 5-6 feet in circumference. Its wood is pure-white when young and turns brownish when old, is close-grained and hard, and is used for art work and rifle butts.

(5) Oak, of which there are several species, all noted for hardness and decay-resisting qualities, and used for boat-building, oars, and car axles.

(6) Poplar, often reaching 60 feet in height and 7-8 feet in circumference. Its white soft wood is mostly used for match wood and paper-pulp and occasionally for structural purposes.

(7) Birch. Inside its yellow striped bark, this yellowish white wood is hard and close-grained. It is mostly used for making handles of farm implements. Its bark is used for dyestuffs and in tanning processes.

(8) *Tilia* reaching 50 feet in height and 5-6 feet in circumference. Its soft, white wood is very pretty and suitable for interior decoration, but its principal use is for making match sticks. The fine fiber of the bark is used for weaving cloth.

(9) *Aconthopanax ricinifolium*, a species of catalpa, reaching 50 feet in height and over 10 feet in circumference. Its wood is rather hard and marked by beautiful curved lines, and is used for making furniture and rifle butts.

(10) *Syrunga amurensis*, about 30 feet in height and 2 feet in circumference. Its white wood has a shiny appearance, and is used for carved work and small articles of household decoration.

(11) *Phellodendron amurensis*, reaching 70 feet in height and 7-8 feet in circumference. Its wood is hard and yellowish, and is mostly used for decorative purposes.

Of the various forest areas mentioned above, the Yalu River Valley district on the south-eastern corner of Manchuria is the most important source of commercial lumber at present, the eastern part of Ling-Kiang Hsien on the main river and the northern part of Tung-Hua-Hsien on the Hung-Kiang being the two best known producing centers. This area is now being worked over by a Sino-Japanese concern employing over 30,000 labourers in the logging camp and for transportation purposes. The company has been operating for about twenty years, during which the regions close to the waterway have already been denuded of their valuable timber. The work is now being pushed farther and farther into the mountain fastnesses from year to year. Twenty other smaller saw mills are operating in Antung, producing annually lumber for export valued at \$7,800,000.

Next in importance is the Kirin area, covering over one-third of the entire province. These forests do not form a continuous stretch, but are divided into two general sections, i.e., the Chang-Pai-Shan section and the Ha-Ta-Ling section. The Sungari River flows through both, forming the main artery. The upper reaches of these areas are merged with the Yalu River forest near the main divide. The lumbering operations are carried on by a number of small concerns and individuals at various locations such as Tu-Tau-Kou, Erh-Tau-Kou, Whei-Fa-Ho, Shih-Li-Ho and Wan-Li-Ho, etc. The logs are usually floated down the river to Kirin, the capital of the province, and exported *via* the Kirin-Changchun Railway and the South Manchuria Railway.

North Manchurian forests are scattered along the Chinese Eastern Railway and are more or less isolated. Aichen, Pinghsien and Tungping used to be important centers of production, but the more accessible locations have all been worked over since the building of the road and the existing forests are at some distance from the railway zone or Mou-Tan Kiang. The "Great Black Back Range" south of the "Mirror Lake" is the best known timber tract (estimated at nearly 3,000,000 mow) and so far has remained untouched. At Lou-Ya-Ling within the district boundary of Moling and Tungning, a similar tract of considerable size is also well preserved on account of its inaccessibility. The largest logging camp in this area is located at the Great Divide of Ta-Hsing-An-Ling east of Mi-To-Ho where a forest covering 53 square verst (Russian mile) is being worked through a Russian concession. Other natural forests exist in the north of Hsiao-Hsing-An Ling and its surrounding regions, but their extent has never been ascertained. Efforts have also been made recently both by the Government and the local people to re-afforest certain areas, especially in southern Manchuria. Many a hitherto barren hillside has been planted with oak seedlings in anticipation of an increasing tussah silk industry. Progress, however, in necessarily slow is the absence of systematic treatment.

III. Mining.

Manchuria is rich in mineral deposits, gold, silver and coal being most abundant, while iron, sulphur, gypsum, asbestos and sodium salts are all found in considerable quantities. Manchuria leads all other provinces in gold production. It is only second to Chihli and Shansi in coal output. Many known deposits are still left untouched on account of their inaccessible location, and many others are being worked in a haphazard manner with very unsatisfactory results. The following list, compiled from government records and supplemented by reports of private individuals, will serve to give some indication of the extensiveness of these deposits.

Fengtien: (1) The Fushun coal mine, situated 60 li from the city of Fushun, Fengtien, is one of the richest deposits of its kind in the world. The mine is now operated by Japanese and directly connected with the South Manchuria Railway, enjoying excellent transportation facilities. Early in the Tsing Dynasty, the area was part of the forbidden territory, owing to its proximity to some of the imperial tombs. Operations were started toward the end of Manchu regime by certain Chinese and Russian interests, but fell entirely into Japanese hands as a result of the Russo-Japanese war. The main coal seam is over 130 feet thick, covering 631,540,000 square feet and the total deposit is estimated at

900,000,000 tons. Over 20,000 Shantung coolies are employed at present, producing 9,000 tons daily from mine vertical shafts. The coal is of Archean origin, lustrous black in color and rich in volatile matter with very little ash content, a composition ideal for steam generators.

(2) The Pan-Chi-Ho coal mine, on the Antung-Mukden Railway, occupies an area of 401,132,000 square feet, having eight seams with an aggregate thickness of a little over forty feet. It is now under Sino-Japanese joint operation, producing over 500,000 tons annually. The coal has a higher percentage of fixed carbon, but has very much less volatile matter than the Fushun product.

(3) The Anshan iron mine is located near the Anshan station on the South Manchuria Railway. The deposit is 300 to 500 feet thick, lying between siliceous rock and mica schist. The mine comprises eight different locations, covering a total area of over 26 square li. Its operation is now in the hands of a Sino-Japanese Company. The entire output of ore, consisting of both limonite and hematite, is contracted to be sold to the South Manchuria Railway.

(4) The Niu-Sing-Tai coal mine is situated on the left bank of Ta-Tse-Ho forming the bowl of a basin amid the surrounding hills. It is being worked by Chinese miners with native methods, producing an anthracite coal of rather high sulphur and ash content. The coal seam is near the surface. Owing to its extreme brittleness, most of the coal produced consists of dust and small particles which depreciate much of its burning quality.

(5) The Tien-Shih-Fu-Kou mine is located about 165 li east of Pan-Chi-Ho with Tai-Pao-Tze as its producing center. It is being worked by Chinese miners from 10 main tunnels. The coal seam varies from two to four feet in thickness, forming an inclined stratum intercalated between sandstone and schist. The coal is also an anthracite and extremely brittle like the Niu-Sing-Tai product.

(6) The Sang-Song-Kang mine is located about 100 li south-east of Hailung on the border of Tung-Hua-Hsien. The mine is sub-divided into three areas, east, west and north by the intervening ridge, but the same seam (which varies from six feet in thickness) runs through all of them. The mine is under Chinese management, producing anthracite coal with a metallic lustre. It is admirably suited for coking, but only a limited quantity is produced, owing to the antiquated methods employed.

(7) The Tieh-Chang coal mine is situated north-east of Tung-Hua-Hsien on the bank of Hung-Kiang. Actual mining operation was started in 1902 and has been kept up in a haphazard manner ever since. The location is quite near Tung-Hua city, but the roads need improvement before wheeled traffic is possible. There are six or seven coal seams intercalated between sandstone, schist and limestone, each varying from 2½ to 4½ feet in thickness. Of these, however, only two or three seams are workable. The whole area comprises two general sub-divisions, commonly known as Pei-Piao and Nan-Piao. The best producing location of Pei-Piao is Ngan-Ti-Tong, while Wei-Tse-Kou is the centre of production for the Nan-Piao area. The coal produced varies from a semi-anthracite to, pure black anthracite with a beautiful metallic lustre.

Kirin: (1) A coal deposit of considerable size is found near the provincial capital, about 70 li north of the city, extending along the provincial highway to Yu-Shu-Hsien for a distance of over 100 li. The coal is mined by native methods at a number of locations, producing several different grades, known under the names of Kou-Chien coal Lou-Chun-Tang coal, Tung-Huang coal, etc. Owing to its proximity to the provincial metropolis, the mine enjoys excellent advantages of transportation and market, but the actual amount of coal produced and marketed is rather limited on account of its inferior quality.

(2) The Sang-Song Kang coal mine is located at 20 li south of Chiao-Ho in the Ho-Lung Hsien. It is operated by native methods, producing daily 40,000-50,000 catties of anthracite coal, chiefly for the Kirin market. On account of its excellent burning quality the coal commands a price six times higher than that produced near the capital.

(3) The Chih-Pieh-Kou gold mine is found 500 li above Kirin Hsien on the Sungari River. The mining area centers about 100 li from Wei-Sha-Ho a branch of the Sungari. The bed rock consists of a kind of crystallized gneiss formed by a combination of green mica gneiss and biotite chlorite. The deposit is found in a nearly straight fissure extending for a distance of over 150 li

and divided into five working sections, *i.e.*, Tu-Tau-Kou, Erh-Tau-Kou, Wang-Pai-Pei-Tse, Lau-King-Chang, and Chih-Pi-Kou of which the last named one is most important. They were rich fields in former days, but have greatly declined in productiveness in recent years.

(4) The Sang-Sing gold mine is in the district of I-Lang-Hsien, about 280 li from the city. It is a placer mine, first worked by a private individual named Sung about 30 years ago, but later transferred to the provincial government and placed under the management of the Sang-Sing Gold Mining Bureau. There are over 30 different locations where the mine is worked, of which Wah-An-Kou, Shih-Men-Chang, Tai-Ping-Chang, Hsiao-Pei-Kou and Hou-Pei-Kou are the best known. The Bureau does not do any actual mining, but collects the gold from licensed miners and divides the proceeds on a 60-40 per cent. basis, the Bureau getting 60 per cent. Annual yield has averaged 2,000 taels of pure gold during recent years.

(5) The Hsing-Lung-Kou gold mine is located within the boundary of Mi-Shan. The mine was originally known as Hwang-Yi-Ho-Tse when it was first operated by Tou Tsai-Li in 1913. Later, the Kirin Government took it over, but as a result of mismanagement, it again reverted to a group of private industrialists. Present production is on a very limited scale.

(6) The Wan-Loh-Kou, in Tung-Ning, the Wu-Hu-Ling, in Mo-Ling, and the Liang-Shui-Chuan in Ning-An were all gold-producing mines under Government operation about 1908, but were subsequently transferred to private industrial groups. Operation is now suspended.

(7) The Tien-Pao-Shan silver mine is located 750 li from the provincial capital and 100 li from Yen-Ki. Operations were started about 1908 by a Sino-American combination. Owing to the failure of the American partner to take sufficient interest in the enterprise, Japanese capital was introduced to form a new combination under the name of Ta-Hsing Company which took over the management about 10 years ago. A large number of Japanese have moved in since that time, creating a quite prosperous looking mining town; but little is known of the present condition of the Company.

(8) The Tsing-Shih-Tsi copper mine is located about 30 li from Pan-Shih-Hsien. Operations were started in 1907 with Government capital; but owing to poor results, the mine was transferred to a Shanghai merchant named Tang-Chien-Chang two years later. By that time, however, the surface ore had been exhausted and the Pan Shih Copper Company soon suspended operations, as no new capital could be obtained for deep mining.

(9) The Pi-Chow copper mine is located 130-li from Wah-Tien-Hsien. The Pao Chwang Hsing Copper Mining Company was organised by a certain Su-Tao-Ting in 1913 to prospect and work the mine. After exhausting an initial capital of \$20,000, work was suspended without coming to the producing stage.

(10) The Kwang-Tung-Tse iron mine is located 40 li north of Pan-Shih-Hsien, first worked in 1893 by two local capitalists with the help of Korean smelting experts. The venture proved a failure. In 1914, a certain Hsu Chu-yung took it up by organising the Pan-Shan Iron Mining and Smelting Company with a capital of \$100,000. Operations, however, were soon suspended after considerable loss had been suffered. The deposit does not seem sufficiently large to warrant much outlay in spite of its very high grade ore.

(11) The Ta-Chu-Chuan iron mine is adjacent to the Kwang-Tung-Tse, about 10 li to the north-west. Korean miners have been working there for generations. The Pan-Shan Company mentioned above tried to exploit it in 1914, but gave it up after an initial sum of 200,000 strings of cash had been spent. The same conditions, *i.e.*, good ore but insufficient quantity, render it not worth developing.

(12) The Po-Li-Ho-Tau iron mine is located 60 li from Pan-Shih. Its excellent ore prompted a certain Hsu-Pang-Yi to apply for a license in 1914, but, warned by the failure of the Pan-Shan Company, little work has been done.

(13) The Kwan-Ma-Chu lead mine is located 100 li from Pan-Shih. It was operated by Ho-Ting-Shi in 1914, but suspended after incurring considerable loss.

(14) The Kwan-Chen-Tse coal mine is operated by the South Manchuria Railway. The Wang-Pao-Shan coal mine is under Sino-British management. The Ho-Shih-Ling coal mine in Kirin Hsien is operated by the Yu-Chih Company, a Sino-Russian organisation.

Heilungkang: The Mo-Ho gold mining area is by far the most prominent and important among the mining enterprises in the province. The coal area lies close to the Russian border and extends for a stretch of several hundred li. Operations were first started by Li Hung-chang with Central government capital, but lack of proper supervision caused a loss of 200,000 taels before the management was transferred to the Heilungkang Provincial Government in 1910. The Government Gold Mining Bureau maintains its headquarters at Mo-Ho, on the south bank of the Amur River, with branch offices in several important mining centers, such as Chi-Chien-Ho, Kwan-Ying-Shan, Ku-Mar-Ho, Wo-Tung-Ho, Hsing-Hwa-Kou, etc. Licensed miners are provided with food and equipment by the Kwang-Sing Company, which collects the gold sand at a fixed rate, of which 20 per cent. goes to the Government. Among the private companies the most successful are the Feng-Yuan Gold Mining Company, which produced over three million dollars' worth of gold in 1923 at Wutakou and Chutuhoh (near Aigun), and the Heiho Citizens' Gold Mining Company which works gold placer along the Hei-Ho. Other mines in the province are either too small too little developed to be worthy of mention.

IV. Salt and Fisheries

Manchuria has a considerable coast line along the Yellow Sea and the Gulf of Chihli and Liaotung, in addition to numerous fish-bearing rivers and streams, but owing to the prevalent dislike for sea food on the part of the Manchurians, the fishing industry never attracted much attention on the part of the native inhabitants until the Japanese took the initiative. The existing fishing activities are mostly developed under Japanese influence. The three main fishing areas comprise (1) the Yalu River near Antung Ta-Ku-Shan, Fenghwangchen, Su-Yen and Kwan-Tien, (2) the sea coast near Chinchow, Fuchow, Dairen and Port Arthur, (3) the Liao-Ho near Kaiping, Hai-Chen, Yingkou, Singming, Tiehling and Fengtien. The fish caught is largely consumed by Japanese residents, although the Chinese have acquired a keen taste for this kind of food during late years.

Salt is manufactured by the sun-dry method all along the sea coast, the most important producing centers being Yingkou, Panshan, Kwangning, Ningsui, Chihhsien, Anfeng, Fuchow, and Chwang-Ho. The total annual yield is estimated to be about one-seventh of the total for the whole of China—varying from six to nine million piculs.

V. Manufacturing and Trading

In the early days, Manchurian manufacture largely consisted of handmade articles produced by household industries. Factories using machinery and steam power dated back to 1902 when the Russians organised three pioneer flour mills in Harbin. As the "Three Eastern Provinces" are rich wheat producing provinces (the Japanese estimate gives 85,000,000 mow, producing over 15,000,000 piculs of wheat annually), it was natural that the industry developed by leaps and bounds during the ensuing years. At present, fourteen large mills are in existence in South Manchuria, each capitalized at \$200,000 to \$5,000,000. Of these, five are Chinese, five Japanese, and four Sino-Japanese. They are located at various important trading centers such as Mukden, Dairen, Tiehling, Liaoyang, Kaiyuan, Fushun and Changchun, the last named city claiming the largest number (five mills). In North Manchuria, there are 36 mills, located mostly at Harbin and Fuchiatien of which 24 are Chinese, 8 Russians, 2 Japanese and 2 Sino-Russian. These mills are not so highly capitalized as the south Manchurian mills, and many of these change hands at every political or financial crisis.

The oil presses are also important, Manchurian factory enterprises turning out bean oil and beancakes for export. Dairen is the most important center for this industry, with 59 presses. The total number of such establishments in the whole of Manchuria is reported to be 138. The old-style native presses using animal and man power number 374, and are scattered in various parts of the province. In the production of oil and beancakes, Manchuria leads all the other provinces by far. Other modern factories, such as cotton mills, tanneries, silk filatures, soap and candle factories, match factories, etc., are of more recent development, but they hold promise of growing in importance in the course of time. A few modern sugar refineries have been in existence for some years,

but production has largely been hampered by the shortage of raw material (sugar beet) and by keen foreign competition. Other minor industries are the manufacture of cheap pottery, pewter ware, cigarettes, confectionery, felt, carpets, iron and tinwares, but none of these call for special mention. The articles of daily use are supplied by numerous rural undertakings, using primitive tools and locally produced raw material.

With the development of industry and the improvement in facilities of communication, an international and inter-provincial commerce is being built up and is steadily growing. In half a century, beginning from 1858, 27 commercial ports have been thrown open to foreign trade. Owing to its rich resources, Manchuria is one of the few regions in China which shows a favorable balance of trade every year. The total value of its imports and exports averages over 20 per cent., or one-fifth, of the total foreign trade of China. In view of these ver-increasing mileage of railroads and motor roads now in construction and the constant impouring of immigrants from other provinces (principally Chihli and Shanghai), future developments are assured in spite of periodical political disturbances. The following table compiled from data extracted from Customs returns will show the principal trade and relative significance of the more important trade marts in Manchuria.

Dairen. Leased to Russia in 1896, but transferred to Japanese control in 1905. It is an ice-free port with good transportation facilities provided by the South Manchuria Railway. Principal exports consist of wild cocoons and silk destined for Chefoo, Shanghai and Japan, bean-oil for Europe and America, bean and bean-cakes for Japan, wheat, coal and millet for Chinese coastal markets. Imports consist mostly of cotton, textiles gunny sacks, paper, medicine, sugar, rice and machinery. Two-thirds of Manchuria's external trade pass through this port, which is now ranked as the second largest port in China. Its total value of trade (in Haikwan taels) for the last three years is shown as follows :

	1922	1923	1924
Imports	65,667,395	68,416,348	77,160,431
Exports	91,191,121	111,451,223	121,934,689

Yingkow. Opened to foreign trade as a result of the Tientsin Treaty. The site formerly known as Newchwang is not exactly the present location of Yingkow, although the two names are used interchangeably. The Liao river furnishes the chief means of transportation, but owing to winter freezing, the port can in no way compete with Daiern. Principal exports consist of agricultural products destined for other coastal provinces and Japan, while cotton textiles make up the bulk of the imports. In the early days, it was the leading market of Manchuria, but has greatly declined in commercial importance since Dairen was opened to trade. The present total value of goods passing through the port amounts to only a small fraction of the Dairen figure, as shown in the following :

	1922	1923	1924
Imports	9,849,376	11,920,059	11,910,533
Exports	3,996,576	3,926,366	2,947,179

Antung. Opened to foreign trade as a result of the Sino-American Treaty of 1903, but actual trading did not begin until 1907. Situated on the Korean border and strategically located on the Antung-Mukden Railway, it is the principal gateway for all traffic *via* the Korean route. Principal exports consist of tussah silk, cocoons and lumber from the upper reaches of the Yalu river. Japanese textile goods and silk fabrics make up the bulk of the imports. With the recent development of the Manchurian market, there has been a steady growth in the trade activities of this port. The total figures for the past three years are shown as follows :

	1922	1923	1924
Exports (in Hk. taels)	24,135,605	41,886,998	32,311,778
Imports	30,108,230	26,818,200	23,826,624

The above figures include the trade returns of Tatungkou a subsidiary station of Antung situated on the sea coast at the mouth of the Yalu River. Tatungkou was opened as a port at the same time as Antung, and in former days, rivalled Antung in the amount of lumber passing through. The business, however, has greatly declined since the railway came into existence and the harbor has fallen more or less into disuse.

Aigun. Opened to foreign trade in compliance with the Sino-Japanese Treaty of 1905. The Sungari and Amur Rivers afford

excellent facilities of transportation to and from Harbin. The bulk of trade is with Russia, with wheat flour and other food materials as principal exports and fish products as principal imports. It is the northernmost gateway of Manchuria and the trade rival of Hailanpo, which is directly across the river. Owing to local conditions and the peculiar Sino-Russian relations prevailing in that section, this port has suffered much during recent years, and its once prosperous trade is dwindling almost to the vanishing point.

Sansing, situated at the crossing point of the Mu-Tan and Sungari Rivers, was opened to foreign trade in 1905. Its principal trade with Russia consists of wheat and beans for export and steel and machinery for import. All vessels passing from the Sungari to the Amur River are required to make declarations to the Chinese Customs authorities stationed there.

Manchuli, on the western extremity of the Chinese Eastern Railway, was opened to foreign trade in the same year as Sansing. It is an important gateway for Russian and Mongolian trade and is a distributing center for skins and livestock, which form its principal exports. Suifenhö, on the eastern extremity of the Chinese Eastern Railway, was opened as a trade mart in 1908 on China's own initiative. It is the most important harbor of Kirin province, exporting wheat flour and beans to Siberia and importing lumber and hardware from Russia.

Harbin, opened to foreign trade in 1905 in accordance with the stipulations of the Sino-Japanese Treaty, is the foremost trade mart of northern Manchuria. The Chinese Eastern and the South Manchuria Railways provide excellent facilities for overland transportation, while the Sungari River gives the port easy access to the sea. It was by far the leading port in pre-War days, a primary center of distribution for beans, flour and cereals produced all along the railways and the interior ; but its phenomenal growth was somewhat checked as a result of Russian disruption. The following figures show the aggregate totals for the four ports (Harbin, Manchuli, Sansing and Suifenhö) during the past three years.

	1922	1923	1924
Exports	38,328,557	33,848,323	45,301,789
Imports	12,097,483	9,236,497	9,439,276

Hunchun and its subsidiary port, Lungtsingsun were opened to foreign trade in 1909 as a result of the Chientao Treaty with Japan. Situated near the southern boundary of Kirin and possessing good harbor facilities, it promises to grow in importance, especially after the completion of the section of the Tien-Tu Railway terminating at Lungtsingsun. Exports are made up mostly of agricultural products of various kinds, supplying the Korean market, while Japanese cotton piece goods and sundry commodities constitute the principal imports. Total value of trade in taels during the last three years is shown as follows :

	1922	1923	1924
Exports Tls.	1,662,821	2,314,204	2,105,182
Imports	3,153,008	4,243,566	4,118,454

Aside from the above-mentioned ports, Mukden was opened to foreign trade in 1903 under the Sino-American Treaty ; Fenghwangchen, Liaoyang, Singming, Tiehling, Tungkiangtse, Fakumen, Kirin, Changchun, Ningkuta, Tsitsihar and Hailar were all opened to foreign trade in 1905 under the Sino-Japanese Treaty, while Hulutao. Tsenchiatun and Taonan were declared open by China herself in 1914. These ports with a few exceptions have all grown in importance commercially. In general, it might be said that Manchurian trade with the outside world has been developed more steadily and faster than has the trade of the other provinces, and promises to continue developing at a similar rate, as its inherent resources are still far from being fully exploited.

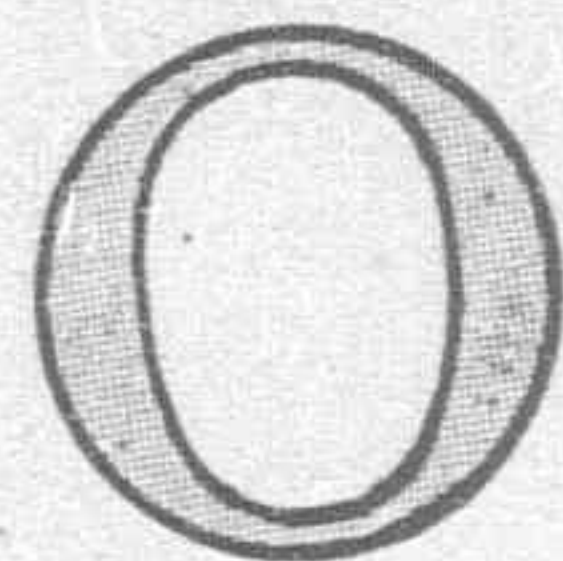
List of Vessels Constructed by Wm. Simons & Co., Ltd., Renfrew, During the Year 1925

Vessels Constructed	Gross Tonnage	I.H.P.	Owners
Cable Steamer	1,552	1,500	Indian Government
Sludge Steamer	1,370	1,400	Corporation of Glasgow
Bucket Hopper Dredger	252	650	Colonial
Pontoon	150	—	Foreign

Extensions at the Shanghai Waterworks

By C. D. Pearson

A Paper read before the Engineering Society of China



OWING to growth of the population and an ever extending demand for water for domestic and industrial uses it has been necessary for the Shanghai Waterworks Co., Ltd. to make periodical increases to their plant and distribution system.

The purification and pumping plant, as well as the distribution mains, have necessarily to be designed to deal with the heaviest demand put upon them at any one moment.

The diagram fig. 1 shows the increase in the maximum hourly demand for the past five years, and it will be seen that there has been an average annual increase of 10 per cent.; the diagram also shows the average hourly demand.

Before describing the steps which have been and are being taken to deal with this increased demand, it will be as well to explain the various methods employed in dealing with the water in its journey from the Huangpu to the consumer.

The layout of the works is shewn in fig. 2; the lack of symmetry is due to the works having been increased from time to time, to the difficulty in obtaining land and, to some extent, to the adoption of new processes.

Settling Tanks

Originally water flowed by gravity into the settling tanks where it was allowed to lie quiescent and the partly clarified water was then pumped to a service reservoir whence it flowed by gravity to slow sand filter beds, the filtrate then passing to the pump wells when it was pumped to Shanghai.

As the demand increased, the walls of the settling tanks were raised to increase their capacity and the tanks were filled partly by gravity and partly by centrifugal pumps installed on the river bank.

Five years ago it was decided to obtain a quicker and more effectual clarification in the settling tanks by the use of a coagulant, sulphate of alumina being found to be the most efficient and suitable; this coagulant is added to the raw river water at the point at which it leaves the river pumps.

An additional reason for employing a coagulant was that the filters could be, with the clearer water, speeded up and at the same time the clarity and purity of the filtrate improved; experience has proved that our expectations were more than fulfilled.

The alum is fed to the river pump deliveries by dry feed machines driven electrically; it is considered that this method is more suited to local conditions than the more usual one of feeding in solution.

In order that native alum may be used a small crusher, which has proved most successful in every way, has been installed.

A coagulant house will be built in the near future to contain the alum handling, crushing and feeding plant.

With the demand for more water and the increasing cost of land, it was this year decided that the output from the works could most economically be increased by adapting the existing intermittent settling tanks for continuous settlement and by replacing some of the existing slow sand beds by rapid or mechanical filters; the construction of these new works is now well advanced and will be completed in time for the heavy demand this summer.

The settling tanks now being altered are Nos. 2 and 3 (*vide* fig. 2), in 1927 it is proposed to adapt No. 1 tank and, in 1933, No. 4 tank. The output of these four tanks will be increased from 1,600,000 to 3,100,000 gallons per hour and, from large scale experiments already carried out, it is expected that better clarification will be obtained with a reduced alum dosage.

Water will be passed continuously through these settling tanks, Nos. 1 and 2 tanks being worked in parallel and then in series with Nos. 3 and 4. The raw water will be admitted at points "A" and "B" (*vide* fig. 2) where the necessary alum dose will be added and an intimate mixture will be obtained by then passing the water through a mixing chamber (*vide* fig. 3) which consists of

baffle walls so placed as to give a velocity of 6 inches per second and a contact period of 15 minutes. The combination of the alum and raw water results in the formation of particles of floc and it is anticipated that the design of this mixing chamber will give what is required, particles of the most effective size uniformly distributed.

From the mixing chamber the water will pass through each of Nos. 1 and 2 tanks in each of which a baffle wall will be constructed; the partly clarified water will then be conveyed by channels to No. 3 tank, which will be unbaffled, and will then, until No. 4 tank is used continuously in 1933, flow from there through another channel direct to the pump wells at "C" and "D" (*vide* fig. 2).

The arrangement of baffles shewn on the drawings give the following velocities and contact periods, which approximate very nearly to the velocities found desirable by experiments carried out on a large scale and under, as nearly as possible, the same conditions.

Nos. 1 and 2 tank—	velocity 1.0 in./sec.—	contact period 80 mins.
„ 3 „ „	0.5 in./sec. „ „	100 „
„ „ „	0.5 in./sec. „ „	100 „

The intermittent settling tanks are cleaned by being emptied, the accumulated mud being broken up hydraulically and then pumped out. Nos. 3 and 4 tanks when used continuously will be cleaned in the same way but in the case of Nos. 1 and 2 tanks, where the deposit of mud will be heaviest, cleaning without emptying is essential. After experiment it has been decided to form on the bottom of these tanks a series of inverted prismoidal mud pockets at the base of each of which will be a mud valve operated from the top; to clean a pocket the mud valve will be opened and the mud forced by the head of water above, it, through the mud pipe, to an electrically operated mud pump.

A divisional wall is being constructed in No. 3 tank to permit the cleaning of one half at a time.

Rapid Filters

As a result of experiments carried out during a period of three years on a two million gallon a day rapid filter plant and after an inspection of the leading American waterworks plants dealing with turbid and polluted waters, it was decided to construct a battery of eight reinforced concrete rapid gravity filters with a total output of 24 million gallons per day.

Two slow sand beds have been demolished to make room for these filters and their contingent wash water tank.

These rapid filters will deal with approximately thirty times as much water as slow sand beds on the same area.

These filters (*vide* fig. 4) are placed on each side of a pipe gallery containing the raw, filtered, wash water pipes and drain; each filter is divided by a central double conduit.

Raw water passes along the upper portion of this conduit and through openings in its side walls to the filter itself; after percolating through the sand the filtered water passes through perforated pipe laterals laid on the bottom of the filter, to the lower portion of the central conduit. On the filtered water outlet from each bed is placed a controller the function of which is to automatically regulate the flow through the filter to a predetermined rate.

From the controller the filtered water passes along channels beneath the pipe gallery to a sterilisation point where chlorine solution is introduced; the filtered water then passes into a storage space beneath the filters themselves and flows thence to the main pump wells.

The storage space provided is sufficient to give the contact period required between the chlorine and the water during the maximum rate of flow of the whole battery.

Owing to high rate of flow through it a rapid filter necessarily requires cleaning at frequent intervals; the cleaning is effected by passing filtered water, under pressure, in a reverse direction to the normal flow when filtering. The wash water passes through



The delivery sluice valve is electrically operated.

Accommodation has been made in the house erected for this set for a second pumping unit of the same capacity.

New Intake

The existing primary pumping sets obtain their water from suction pipes laid on the bottom of the river; to the river end of these suction pipes is fitted an adjustable arm worked from a supporting timber structure which also serves as a filling point for the Company's water boats.

Owing to the Huangpu Conservancy Board's intention to dredge a channel inside the existing intakes the pipe supplying the new pump had to be sunk ten feet below low water level.

In view of the danger of a long suction at this depth and to the desirability of the new pipe supplying more than one pump, it was decided to sink a cylinder in the river bed, to construct a suction well immediately outside the pump house and to connect the two by means of tube sufficiently large to supply three one million gallon an hour pumps by gravity.

The cylinder (*vide* fig. 5) has a total length of 45 feet, 18 feet being below the river bed. The cylinder consists of eight steel sections, welded not rivetted; the sections are connected by internal flanges.

A diaphragm with four hinged doors is placed below the tube opening; these doors were opened during the sinking of the cylinder to allow the mud to be removed and could be closed to control the perpendicularity of the cylinder.

Three 48-in. sluice valves are placed below L.W.L. in the cylinder and are operated by gearing from a platform at the top.

The tube connecting the cylinder and the pump well is 170 ft. long and is of steel, each section being also welded longitudinally; the sections are joined by loose flanges.

This tube also contains a pressure supply pipe for filling water boats and a mud discharge pipe from the continuous settling tank mud pump.

Secondary Pumps

Water from the settling tanks to the service reservoirs and filters is pumped by means of nine centrifugal pumps, four being steam driven and the remainder being driven by suction gas engines.

The three largest pumps have a capacity of 450,000 gallons per hour, and are single stage low lift centrifugals driven by horizontal double cylinder engines working on four stroke cycle, each with a B.H.P. of 152 and a speed of 170 r.p.m. The drive is by rope in the case of the larger and belt in the smaller sets.

Gas is provided by six suction producers each consisting of generator, vaporiser and coke scrubber; the fuel employed is anthracite.

Main Pumps

All main pumps delivering filtered water to consumers are steam driven and, with one exception, are double acting plunger pumps.

The two original pumps, which will be replaced by a new pump in 1927, have capacities of 78,000 and 120,000 gallons per hour respectively, but are no longer sufficiently economical to justify their retention.

In 1919 the largest set at present running, with a capacity of 360,000 gallons an hour, was installed; this was followed in 1921 by two pumps, one, a three stage centrifugal direct coupled to a high speed compound vertical engine running at 300 r.p.m., with a capacity of 300,000 gallons an hour, and the other an American built pump with a capacity also of 300,000 gallons an hour; in this set the flywheel is placed between the steam and water ends, an arrangement which considerably economises floor space.

A new engine is now being erected; this is a triple expansion with a capacity of 600,000 gallons an hour, the leading dimensions, as compared with the previously largest set (No. 6) are as follows:—

	New Engine.	No. 6.
Cylinders	26 in., 42 in. and 69 in. dia.	30 in. and 56 in.
Stroke	5 ft. 0 in.	4 ft. 0 in.
Revolutions per minute	24	30
Pumps	21½ in. dia.	20-5/16 in. dia.
Capacity	600,000 galls./hr.	360,000 galls./hr.
Steam per P.H.P. hour	13.95 lbs.	15.57 lbs.
Steam pressure at boilers	150 lbs./sq. in.	100 lbs./sq. in.

Main Boilers

All main boilers are Lancashire type, those in the new boiler-house being equipped with Underfeed stokers and having forced draught, the same engine driving the stoker gear and the fan. An economiser has been installed in this house raising the temperature of feed water from 100° to 250° Fahr. All boilers are fitted with superheaters, and three of these boilers are fitted with oil burning apparatus which, however, is not normally used.

In the old boiler house it is proposed, during the ensuing year, to raise the steam pressure to 100 lbs. per square inch and to install an air preheater, economiser or possibly turbine furnaces; this work will be done at the same time as a new main pumping engine replacing the two original pumps is being installed.

Engine House

The extensions made in 1920 and during the last year to the new main engine house (*vide* fig. 6) are of some interest owing to it having been decided to construct a well the whole length of the building; one wall of this well carries one of the side walls of the house. The deep excavations required for these wells in the immediate vicinity of deep foundations was the cause of some anxiety during construction, the more so as these foundations carried running machinery, however, to date no difficulties have occurred.

Delivery Mains

The apparently somewhat complicated arrangement of delivery mains immediately outside the new main engine house is shewn in fig. 7; it will be seen that the general idea is that any pump should be able to deliver into any one pumping main through either of two groups of air vessels, this work is now under construction.

Sterilisation Plant

As an additional safeguard all water pumped to consumers receives an exceedingly small dose of chlorine: one part to four million. The two types of chlorinating apparatus in use have proved most satisfactory in every way and enable the Company to supply, notwithstanding the necessarily turbid and polluted source, a water which compares favourably with London and many other large cities.

Subsidiary Pumping Station

In order to reduce the load on purification and pumping plant, and more especially on pumping mains, during the time of maximum demand, two covered reinforced concrete reservoirs with a total capacity of ten million gallons were built in 1920 at the western end of the Settlement.

These reservoirs are filled at night when the demand for water is, of course, reduced and six electrically driven, two-stage centrifugal pumps repump this water into the distribution mains during the peak period. These pumps have a total capacity of 905,000 gallons per hour, the normal quantity pumped per 24 hours being 3 million gallons.

Distribution System

Time forbids a description of the distribution system, but the mileage of mains is now 148 and the annual increase for the last five years averages 5 per cent. The newest pumping main, 40-in., 38-in. and 36-in. in diameter, with a total length of 2¼ miles, was laid in 1921/1922.

Japanese Steel Order for Germany

Recently the Phoenix Steel Works secured an order from Japan for 1,000 tons of rails. Through the Ferrostaal G.m.b.H.—the export department of the Gutehoffnungshuttee—the Steel Cartel has received two orders from Japan for a total of 3,000 tons of heavy rails. Owing to the severe competition of Belgian works the price was exceptionally low. As the Gutehoffnungshuttee has already more orders for steel on hand than it can execute, it is expected that the Steel Cartel will pass the order on to the Bochumer Verein.

The Development of Nagoya

By Eisaburo Kusano

THE rising city of Nagoya, the area of which comprises 57 square miles and the population, 760,000, has ranked itself among the three leading economic centres of Japan. The city is located about half way between Tokyo and Osaka by the sea and is surrounded by a large consuming district; it has all the advantages and conveniences for the reception and distribution of all kinds of products, and the city is also furnished with the railway and other communication facilities—an ideal site for the never ending growth of industrial and commercial plants. It is no wonder that the quick development of the city is unparalleled by any other city within the Empire of Japan.

Nagoya's city construction plan is characterized by the creation of a spacious industrial district. The plan proposes to differentiate the industrial, commercial, and residential areas, and better roads and more canals are to be constructed to connect these districts.

According to the city construction plan which has just been published by the city authorities, the industrial territory occupies will over 30 per cent. of the entire area of the city of Nagoya; it extends to approximately 12,000,000 acres. Through the industrial district, canals will run in all directions, including the Nakagawa canal, a railway station for handling freight exclusively will be established, with a view to facilitating the communication by land and sea.

The Port of Nagoya

The port of Nagoya is now under the third phase of improvement, which will be completed in 1926. On completion, steamers of 10,000 tons can freely enter and leave the port, but at the same time, the fourth stage of development will be started.

Nagoya's export trade dates its commencement from the European War, but as far as the foreign trade is concerned, Nagoya stands fifth in Japan's 41 open ports. The export through the city during 1924 amounted

to 190,000 tons, valued at Yen 41,870,000, and the import, 890,000 tons, Yen 58,650,000. The domestic trade of Nagoya in 1924 amounted to Yen 41,630,000. The aggregate total of foreign trade through Nagoya since the beginning of January, 1925, until November 20 amounted to approximately Yen 10,000,000. It was believed that the sum in 1925 would have been larger than 1924 by about 20 per cent.

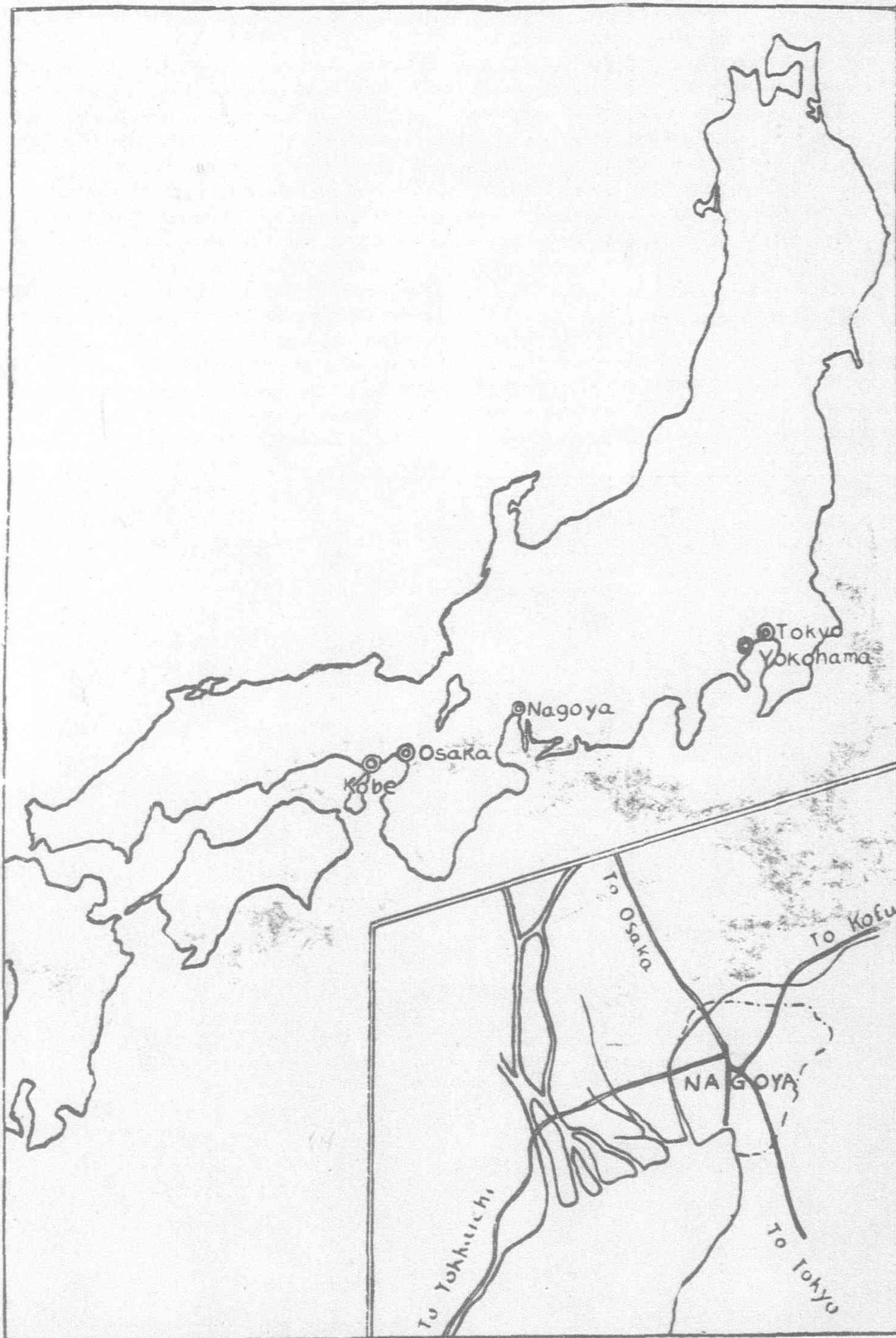
The main items of exports from Nagoya consist of porcelain, cotton textiles, cotton yarn, wooden cases, clocks, spinning machines, looms, iron manufactures, glass wares, electric machines and tools, toys, lacquer wares and lumber. Nagoya imports ginned cotton, lumber, wheat, fertilizer, coal, sugar, wheat bran, rice, and iron materials. Domestic trade of Nagoya is featured by wooden cases, sugar, fertilizer, ceramic wares, rice, coal, etc.

For centuries past, the weaving, dyeing, wooden and paper wares, porcelain and pottery making have been prosperous in Nagoya. But the handicraft has been gradually replaced by the modern factory, and the private owned workshops were reorganized into joint-stock companies. The rise of the hydro-electric enterprises in Aichi Prefecture resulted in the abundant supply of the power at low cost, which assisted the manufacturing industries to make progress with giant stride.

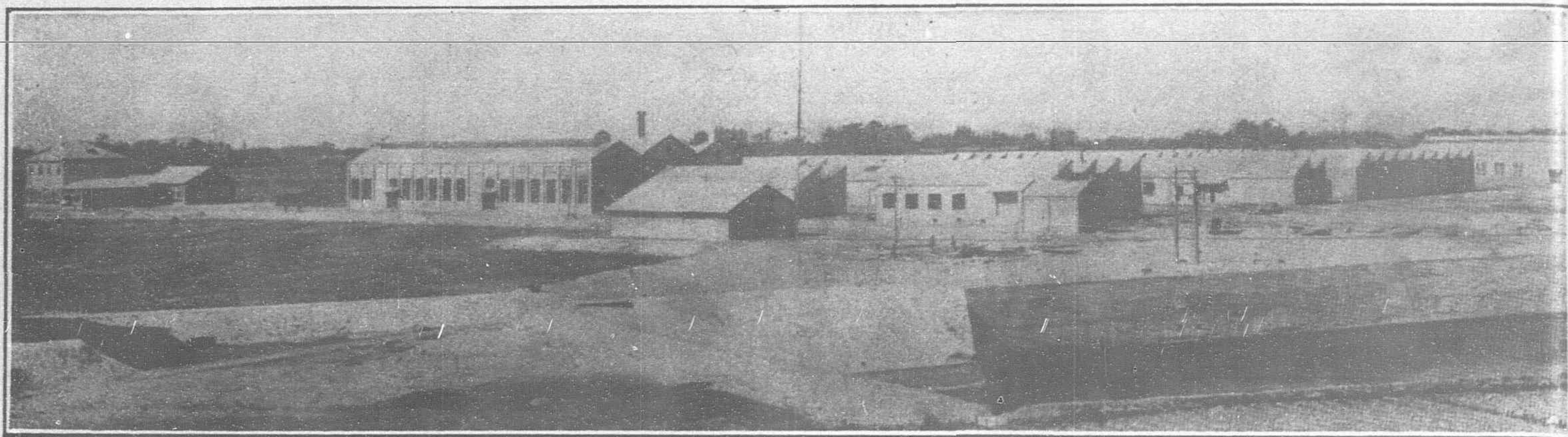
The industrial production in Nagoya in 1923 amounted to Yen 276,000,000. The dye and weaving product that year reached Yen 143,000,000, which is about 50 per cent. of Nagoya's total production in value. The machinery and machine tool manufacturing industry turned out approximately Yen 32,000,000 worth of products, followed by chemical industrial manufactures and industry of food and drinks the output of which reached Yen 29,000,000 and Yen 27,000,000 respectively.

Industrialization

Nagoya is also noted for its cotton textiles. More than 600,000 spindles are in operation in and around the city. But a



Map of Nagoya



Shinkawa Spinning Machinery Factory of the Toyoda Looms Manufacturing Co.

large volume of serges, flannel and musline are also produced. The manufacture of wheat flour is the feature of Nagoya's food industry. The machinery manufacturing industry in Nagoya has also made a speedy development in recent years. It is the pride of this city that there are many factories which turn out special machinery, such as airplanes, arms, in addition to a large quantity of clocks, internal combustion engines, rolling stock, spinning machines, and bicycles. The annual production of weaving machinery within and out of the city amounts to approximately Yen 4,000,000. The Toyoda Looms Manufacturing Company's product occupies most part of it. The company was formerly called Toyoda Shokai and it was run by Mr. Toyoda, inventor of the weaving machine, but the concern was reorganized into a joint-stock company in 1907.

Weaving and Dye Industry

The weaving and dye industry has led all the other manufacturing industry within and out of Nagoya for generation after generation both in the number of people engaged in the work, and also in the value of the annual production. Today, Nagoya is noted not only as a local centre of the textile manufacturing district, but also, as a weaving machinery producing district, mainly due to the establishment of the Toyoda Looms Manufacturing Company.

The Aichi Prefectural Government (Nagoya is central city of Aichi Prefecture) has recently published that there were 26,510 textile manufacturing factories, including those which belong to the domestic type of industry, in Aichi Prefecture at the end of 1921. These factories operated 38,219 power-looms. The annual production in 1921 of the textiles was valued at Yen 165,966,577, the details of which are as follows:

Kind of Manufactures				Value
Cotton textiles	...	...	...	Yen 108,282,636
Silk textiles	...	...	...	5,669,257
Silk Cotton Mixed textiles	...	...	...	19,809,227
Woollen textiles, and other mixed woven goods	...	...	...	30,269,276
Others	...	...	...	1,936,181
Total	...	...	...	Yen 165,966,577

The output of cotton textiles, which leads all the other fibre manufactures in this prefecture has also made Aichi Prefecture one of Japan's main cotton textiles manufacturing districts. The chief product is the striped cloths woven with the gassed and other cotton yarn. White cloths known as Okamoto Momen, Chita Momen, Mikawa Momen and export goods, are also produced, the width of the last mentioned being wider than the rest of them.

The striped cloths, which are largely produced in and around Nagoya, are not only consumed in this country, but also, heavily exported to foreign countries.

The manufacture of the woollen textiles and other mixed woven goods in Aichi Prefecture was started in 1889. One of these pioneers at one time tried to make musline, and later succeeded in producing special serges which are now widely used in making native Japanese kimonos. Meanwhile the production of mixed woven goods of gassed cotton yarn and silk started, followed by the production of mixed woven goods of woollen yarn and other threads, which won great popularity, as it is comfortable when worn as a kimono, and also, its appearance is suited to the taste of the public. As a result, a large number of factories were built at various parts of Aichi Prefecture to make such mixed woven goods. At present,

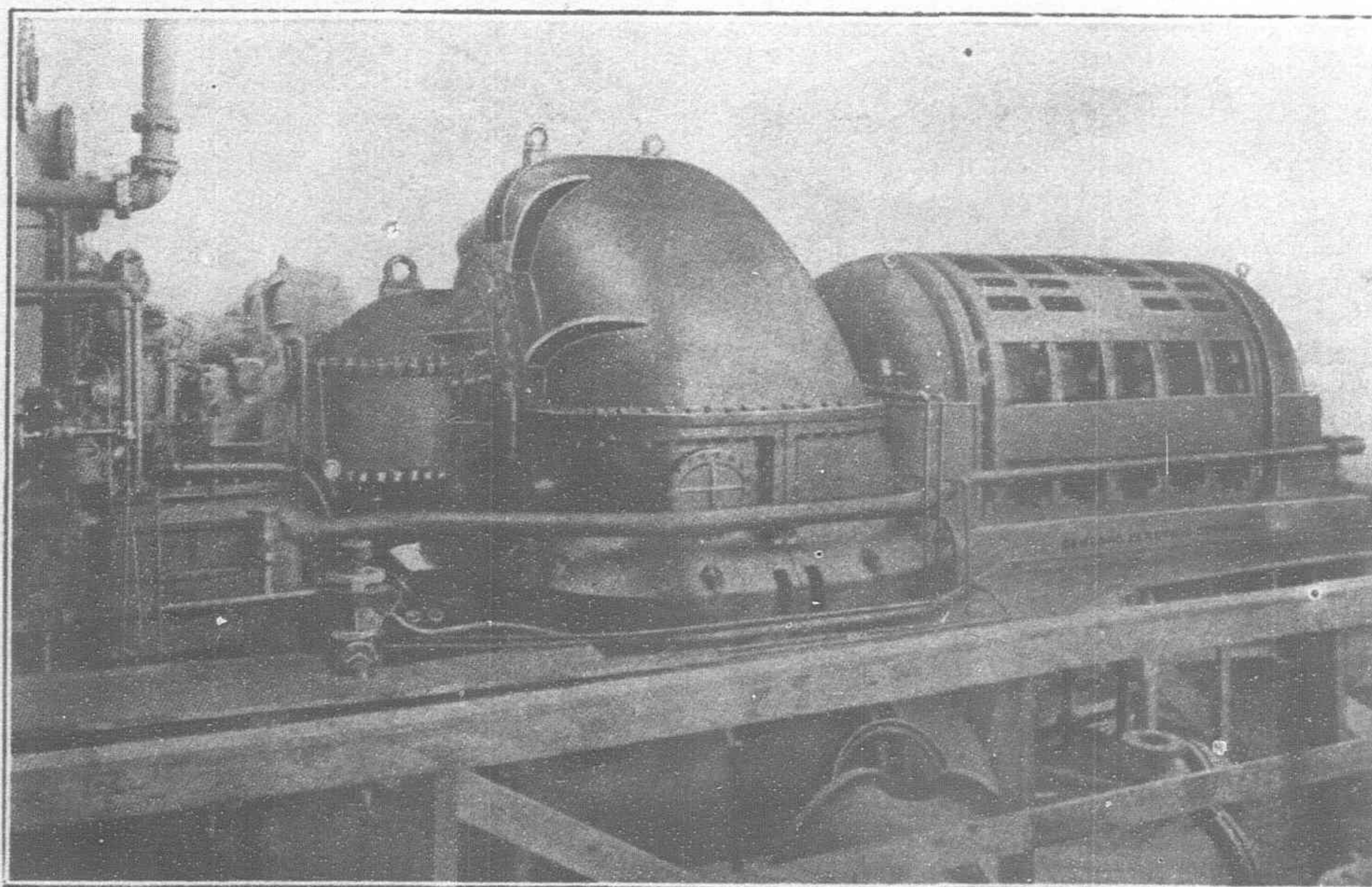
the city of Nagoya, Kaibe County and Nakajima Country are Japan's most prosperous mixed woven goods producing districts.

Figured habutae features the silk textiles in Aichi Prefecture. Niwa Country and Haguri Country are Japan's principal figured habutae producing districts. Both in Nagoya city and Haguri Country, chirimen (crepe) is produced for export purpose. The production of ordinary habutae has recently risen in this prefecture.

The silk-cotton mixed woven goods are produced, not only in the city of Nagoya, but also in Niwa, Nakajima, Haguri, and

Kaibe Countries of Aichi Prefecture. In fact, Aichi Prefecture is classed with Ashikaga of the Kanto districts. So far as history goes, the manufacture of silk-cotton mixed woven goods was started in the Tensho era. Since the introduction of the gassed cotton yarn in the early part of the Meiji era, this industry has witnessed marvellous development. As a result continuous improvement, and devices introduced in this direction, Aichi Prefecture has made a name for itself as a special silk-cotton mixed woven goods producing district.

The knitted goods are turned out everywhere in Aichi Prefecture.



New 35,000 kw. generating unit recently completed and shipped by the General Electric Company to the Toho Company for its Nagoya Steam Station

fecture, but a greater part of them are manufactured in Nagoya. A Mr. Sato started making socks and stockings in Nagoya in 1885. This was the beginning of the knitted goods manufacturing industry in Aichi Prefecture. This industry became prosperous during the Russo-Japanese War (1904-5), when the army authorities started using underwear made of knitted goods. At present, the knitted goods are produced at about 300 factories, and the annual production reaches nearly Yen 8,000,000.

Dye Industry

The annual production of the dye industry, which is estimated by the cost of dyeing, was valued at Yen 7,990,391 in 1921. The main work is the dyeing of cotton and other yarns, with which textiles are produced, and printing and dapple dyeing. The Arimatsu variegation, which is often referred to as "national dapple dyeing" was started by a Mr. Takeda of Chita Country during the Keicho era. Owing to the untiring improvements introduced to the technique of this dyeing for centuries past, it has won its present popularity. This Arimatsu variegation is also produced in and out of Nagoya and the production in Nagoya exceeds that of the Arimatsu district.

According to the Aichi Prefectural Government, there were 41 factories engaged in the manufacture of weaving machinery and parts thereof, at the end of 1921. The annual production during the year under review reached Yen 3,700,000, the largest part of which being manufactured by the Toyoda Looms Manufacturing Company. The Toyoda Looms Manufacturing Company was established in February, 1907, succeeding the private owned factory of Mr. Toyoda who had succeeded in creating the Toyoda type weaving machinery. The authorized capital of the Toyoda Looms Manufacturing Company amounts to Yen 3,000,000, and its reserves reach Yen 1,205,000. Its main factory turns out 18,000 looms annually. The number of employees in the main factory in Nagoya amounts to 800, and that in the Osaka branch factory, to 650. This company has recently built a new factory at Shinkawa-machi, in the suburbs of the city of Nagoya. This new factory will open for operations about March, 1926, with approximately 800 employees.

Porcelain and Pottery Industry

Nagoya exports from Yen 16,000,000 to Yen 17,000,000 worth of porcelain and pottery annually. In 1924, it amounted to Yen.



One of Nagoya's well-lighted thoroughfares

16,822,000. The recent statistics put the annual production of China ware in Aichi Prefecture at something like Yen 19,000,000. It is obvious, therefore, that a large part of its annual production is exported.

In Japan, ceramic wares are generally called "Setomono" which means things produced in Seto. Seto is a little town located in the neighbourhood of Nagoya. In Seto, China ware has been produced for the last 1,100 years, so far as the history goes. The name of Seto came to be widely known since the appearance of Kagemasa Shiroemon Kato, or Toshiro, as he is familiarly known who went over to China during the reign of Emperor Go-Horikawa and learned the Chinese method of making ceramic wares. On

his return to Japan, he opened a ceramic works in Seto, and produced excellent wares. His followers worked hard improving their masters' technique, generation after generation, and the porcelain and pottery in Seto became so famous that all the ceramic wares came to be called "Setomono" although there were and are many other cities where excellent China ware is produced.

Ceramic ware is made, not only in Seto, but also in Nagoya city, where there are many factories which manufacture them on a large scale.

Shippo enamelled wares were first produced by Tsunekichi Hitokaji in Kaibe County, Aichi Prefecture, towards the end of the Tokugawa Shogunate. The Shippo wares were introduced abroad for the first time at the Vienna Exhibition held in 1873, and won high praise from foreigners. Ever since, it is widely exported to various foreign countries. At present, the annual production amounts to about Yen 350,000 in Aichi Prefecture.

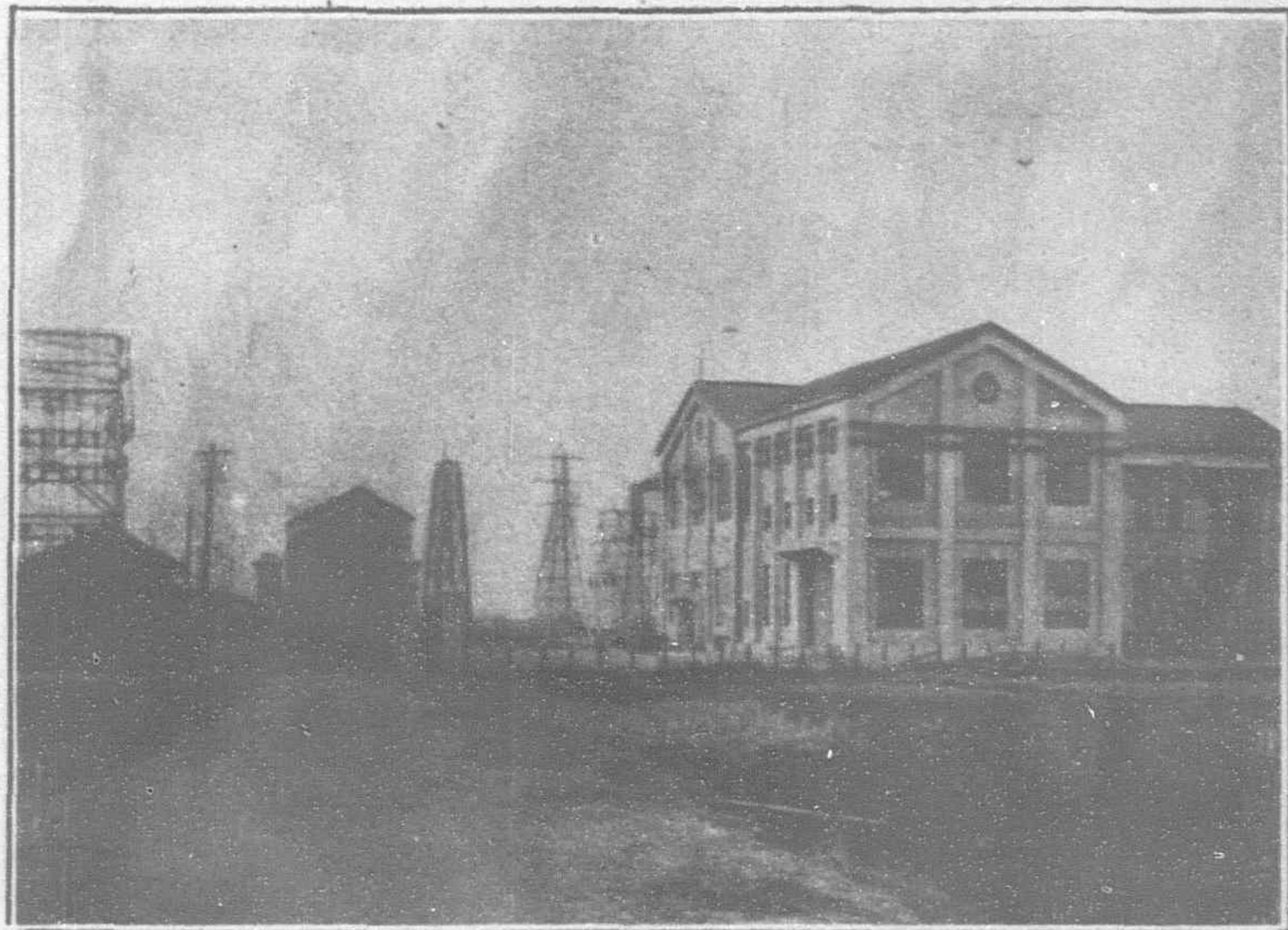
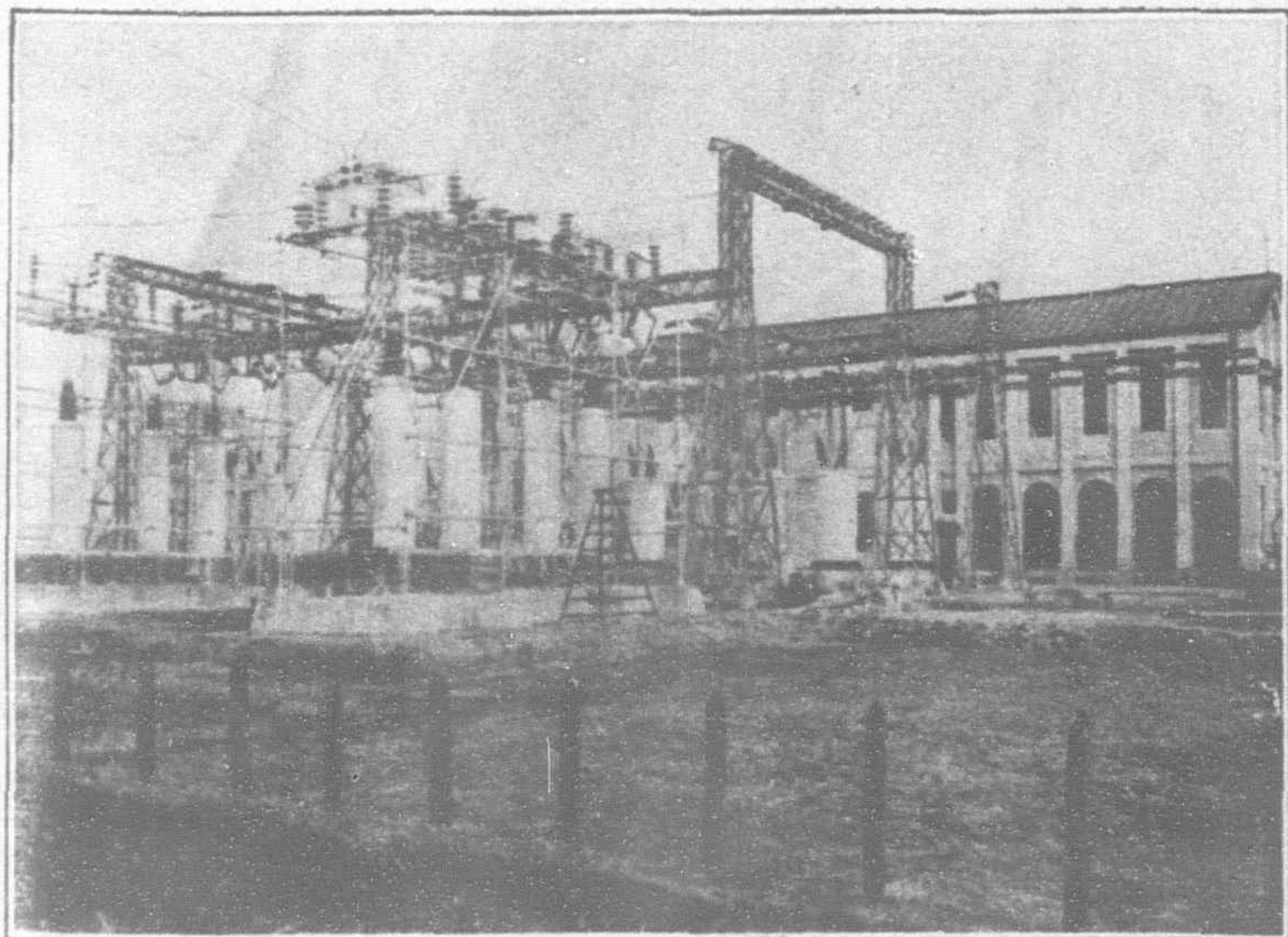
Glass Ware

The manufacture of glass ware in Nagoya registered a remarkable increase in recent years, particularly since they came to be used as table-ware. Bottles made in Nagoya are briskly exported. Although glass wares are manufactured at various places in Aichi Prefecture, they are mainly produced in the city of Nagoya.

Tiles manufactured in Nagoya are widely used throughout Japan. Their annual output reaches approximately Yen 3,444,000.

Beer Brewery

The Dainihon Brewery Company, which represents Japan's beer brewery industry, opened a new factory in Nagoya last spring.



Two views of the Kasumori Sub-station, Nagoya

This company has been created as a result of the amalgamation of several influential beer brewing companies shortly after the Russo-Japanese War (1904-5), as these companies could no longer maintain the keen competition among themselves. The Dainihon Brewery Company now annually turns out 4,000,000 boxes of beer each box containing four dozen, in addition to 450,000 boxes of sold drinks and 200,000,000 bottles.

The construction of the Nagoya factory of the Dainihon Brewery was commenced at Chigusa-machi, eastern suburbs of the city in 1923, and it was completed about the beginning of 1925. This factory, the area of which reaches about three acres, is equipped with the latest brewery apparatus. The engine room consists of four boilers, one electric generator, and four ice manufacturing machines, which can turn out 240 tons of ice in 24 hours. The factory, however, seldom uses ice, as it produces salty water which is colder than ice. The factory uses about 1,850 electric lights. All the machinery is operated by 170 electric motors.

On the average, the Nagoya factory of the Dainihon Brewery Company bottles approximately 26,800 gallons of beer into 180,000 bottles, which are transported either to the Nagoya railway station or to warehouses by over 30 freight-cars every day. The different brands of beer turned out by the Dainihon Brewery Company are; Asahi, Ebisu, Sapporo, Asahi black, Sapporo black, Tsingtao, etc. These won quite a few medals at various international and domestic exhibitions, including the Anglo-Japanese Exhibition of 1910, and the Panama Exhibition of 1915.

In addition to the Nagoya factory, the Dainihon Brewery Company owns six factories at Meguro, in the suburbs of Tokyo, Azuma-bashi, in the same city, Suita, near Osaka, Sapporo, Hokkaido, Hakata, in Kyushu Island, and Tsingtao.

Most of the Japanese are still under the impression that beer is good only for warm weather. This is mainly due to the fact that beer is relatively new in Japan, and that the Japanese people have cultivated for hundreds of years past a taste for their native "sake" which is highly appreciated all the year round, particularly in the cold seasons. But the demand for beer in the cold weather, however, is appreciably increasing of late.

Japan imported something like 80,000 gallons of beer in about 1880. Seven years later, or in 1887, when the anything foreign was fashionable in Japan, the importation of beer amounted to about 360,000 gallons, which is the heaviest quantity that Japan ever im-



Main Street, Nagoya

ported in one year. The domestic production of beer in those days amounted to about 680,000 gallons. The importation of foreign beer into Japan gradually decreased in proportion to the increase in the domestic production. In 1914, it hardly amounted to 12,000 gallons.

The first exportation of Japan made beer was started in 1892 by a certain Sukejiro Yokoyama to Shanghai. As a result of the Sino-Japanese War (1894-5), the number of Japanese residing in Manchuria and Chosen gradually increased, and it even-

tuallly induced the increase in the export of beer to these districts. In 1896, something like 80,000 gallons of beer was exported to China.

At present, Japan made beer is widely exported particularly to China, South Seas, the Strait Settlements, and even to Arabia.

Hydro-Electric Enterprises

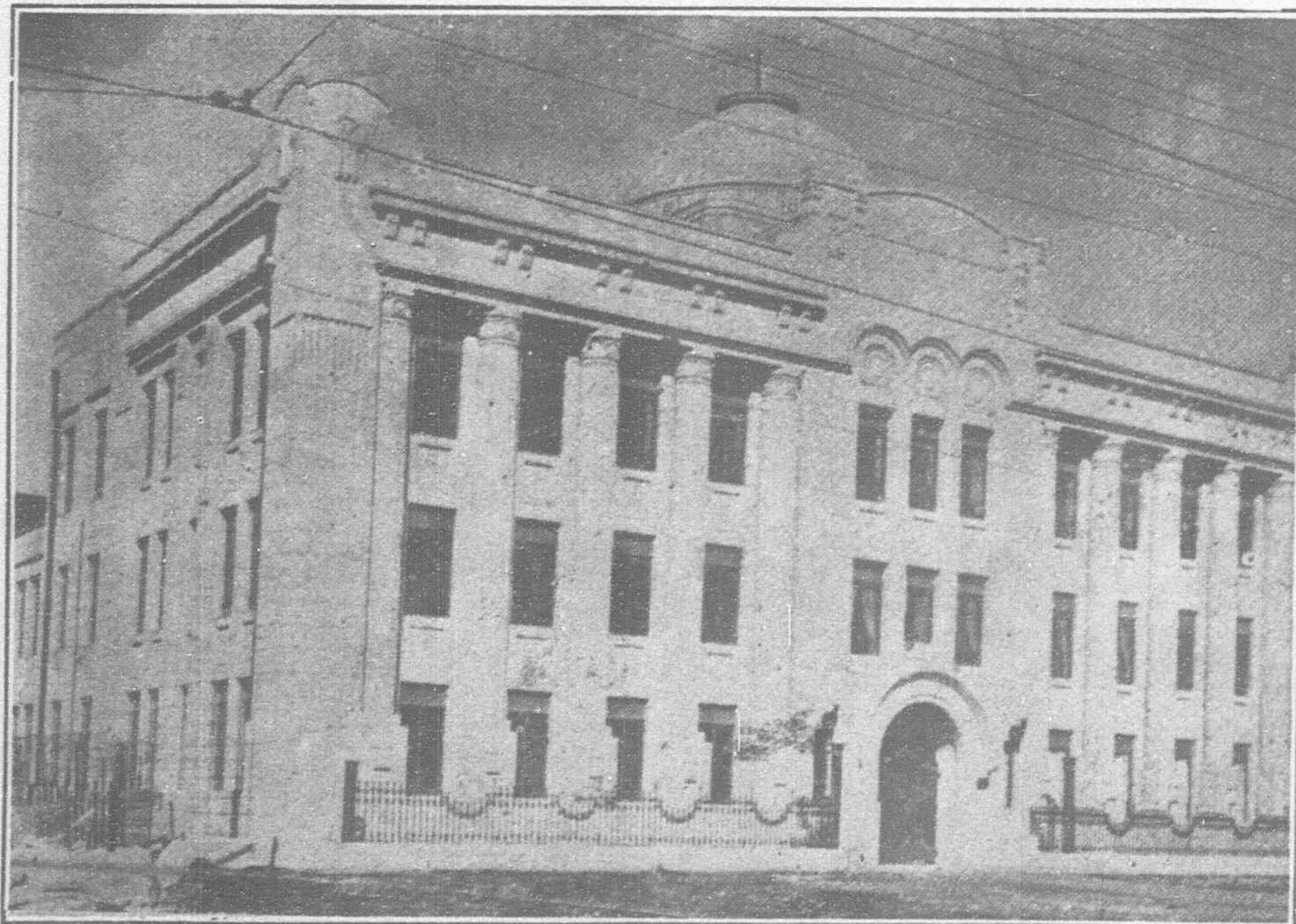
The prosperity developed in the hydro-electric enterprises in the central parts of Japan, particularly on the Kisogawa River, have played an important role in bringing about the marked progress of the manufacturing industry in the city of Nagoya. The brisk export trade through Nagoya remains an important factor for Nagoya's economic development, but it was only when the city came to obtain an abundant supply of electric power at low prices, that Nagoya become one of Japan's three economic centres.

The outline of the development of the Toho Electric Power Company is the history of the progress made in the hydro-electric enterprises in Japan, particularly in Kansai.

As early as in 1889, an electric light company, called Nagoya Dento Kabushiki Kaisha, was organized with a capital of Yen 57,000, and opened its business in Nagoya in December, 1889. This company amalgamated with Aichi Electric Co., with a capital

of Yen 150,000 in 1896 and with Tokai Electric Co., with a capital of Yen 250,000 in 1907. Again in 1910, the company amalgamated with the Nagoya Electric Power Co., with a capital of Yen 5,000,000 to avoid competition and to operate economically. Soon after the company separated the water rights on the Kiso and other rivers and organized a company which has later grown to the present Daido Electric Power Co., to build an indisputable foundation for water rights in central Japan.

In 1920 the Nagoya Electric Light Co., amalgamated with the Ichonomiya Electric Co., with a capital of Yen 500,000. Thus



The Nagoya Chamber of Commerce

the capital of the Nagoya Electric Co., increased to Yen 21,000,000, of which sum, Yen 21,000,000 was paid up.

By this time, however, there had been developed many other electric light and power companies in the central parts of Japan. In order to avoid competition, the duplication of the transmission lines, and general waste of energy; to use the water power sources more economically and effectively; and to give their customers improved service at reduced cost, the Nagoya Electric Light Co., and other companies were year after year amalgamated. In 1921 alone, this company absorbed eight electric light and power companies, as a result of which, the paid in capital amounted to Yen 44,595,885, at the end of December, 1921.

After the amalgamations effected in 1921, the company's name was changed to the Kansai Electric Co., Ltd., whose total capital was Yen 71,389,000 of which Yen 44,595,885 was paid in. This company was amalgamated with eight more companies, including the Kyushu Electric Light and Traction Co., during the first three months of 1922, and the total paid in capital, too, increased to Yen 95,104,235 at the end of March, 1922.

Of these amalgamated companies, the Kyushu Electric Power and Traction Company whose supplying territory constitutes a business district for the present company, had been developed itself to a great electric company, already having joined to itself many small utility companies. In Kyushu, the Hakata Electric Light Co., was the mother company of all, and organized in 1896 with a capital of Yen 50,000. It absorbed 14 minor electric companies during 12 years from 1909 until 1920.

In June, 1922, the Kansai Electric Co., was amalgamated with three more companies, and as one of its consequences, the company established in Nagoya the monopoly business of gas supply side by side with the electric light monopoly. In the same month, the name of the company was changed to the Toho Electric Power Co., Ltd., with the total capital of Yen 139,821,200 of which Yen 99,994,325 was paid in. It had its head office in Nagoya up to September, 1922, when it was removed to Tokyo to meet all requirement arising from the increased fields of activities in the electric industry of central and western Japan.

Announcement of Changes in the Organization of Link-Belt Company

For some time it has seemed advisable to the management of the Link-Belt Company to create a new position—that of Chief Engineer of the company. This new position carries with it the responsibility of general supervision over all engineering work, harmonizing the practice of their several plants, and following up new engineering development. The position is being filled by Mr. W. W. Sayers, formerly Chief Engineer of the Philadelphia plant. His new headquarters will be at the general office address, 910 S. Michigan Avenue, Chicago. It is said that Mr. Sayers is admirably fitted for his new and important duties. He graduated from the University of Illinois in 1897 and, in his 23 years of Link-Belt experience, has successfully held many important positions in the engineering, construction and sales departments of the company.

Mr. George L. Morehead, for the past 6 years attached to the Management of the several Indianapolis plants, and who has made an enviable record for himself there, as well as at the Link-Belt Chicago plant, takes on the duties of Manager of the Philadelphia plant. Mr. Morehead graduated from the University of Missouri in 1902 and he has been with the Link-Belt Company for the past 19 years. In these active years he has successively held the positions of Maintenance Engineer, Superintendent of Construction and Assistant Chief Engineer of the Chicago plant; Assistant Manager of the Link-Belt Indianapolis organization; and then Manager of their Ewart Works and Belmont Works, both located in Indianapolis.

The Link Belt-Company designs and manufactures elevating and conveying machinery, cranes, loaders, and many other types of equipment.

The Link-Belt Company, of Chicago, announces the opening of a branch office in the First Wisconsin National Bank Building, Milwaukee, Wisconsin, with Mr. R. C. Kendall in charge. This step has been taken as result of their constantly growing volume of orders for Link-Belt Silent Chain Drives for the transmission of power.

Holt's New Motorship "Phrontis"

THE *Phrontis* built by the Caledon Shipbuilding and Engineering Company, Ltd., of Dundee, to the order of Messrs. Alfred Holt and Company of Liverpool was successfully launched recently. The leading particulars of the *Phrontis* are as follows:—

Length b.p. 425 feet
Beam 54 feet 6 inches
Depth 31 feet 9 inches
Load draft 26 feet
Gross tons: 6,250 tons, approximately
Machinery power 4,800 i.p.h.
Service speed 13½ knots

The vessel which is intended for passenger and cargo service in the Far East, is built on the transverse system of framing and is of the poop bridge and forecastle deck type. Twin screw machinery developing 3,700 b.h.p. is installed amidships, and has been supplied by Messrs. Burmeister and Wain of Copenhagen.

The vessel is divided into five main holds by five watertight bulkheads, and No. 2 hold is constructed so as to form a deep tank. The double bottom is arranged to carry fuel oil or water ballast in six main tanks, and fresh water or water ballast is carried in the remaining three compartments. The forepeak tank is arranged to carry fuel oil or water ballast, and the after peak tank is arranged to carry fresh water or water ballast. At the foreward end of the bridge deck is a large saloon house, which contains accommodation for the engineers, doctor and chief steward as well as a commodious dining saloon.

On the upper bridge deck accommodation is provided for the captain and officers. The assistant engineers and petty officers' accommodation is arranged in side houses abreast the engine casing and the tops of these houses from the boat deck on which eight 23-ft. life boats are stowed. Accommodation for the crew is arranged on the poop. The cargo loading and discharging appliances are of a very complete nature, there being no fewer than 22 derricks ranging from lifts of 2 tons to that of 40 tons, and for the efficient manipulation of these derricks six 2-ton, eight 4-ton, and four 5-ton electrically driven winches have been installed.

The winches, which are supplied by Messrs. Wilson of Birkenhead, are all of their direct driven type, all gearing being eliminated, and they are operated by a master controller situated in the winch, the contactors being placed in suitable houses. The windlass, which is also supplied by Messrs. Wilson, is electrically driven and is placed on the forecastle deck with a 100 h.p. Laurence Scott motor immediately below.

The steering gear, which is supplied by Messrs. Brown, Brothers & Co., Edinburgh, is situated in a house on the poop deck and is of the Williams Janney Brown electro hydraulic four ram type, having two motors of 30 b.h.p. and two pumps. The steering gear is controlled by Brown's patent telemotor situated in the wheel house, and also from a mechanical standard from the docking bridge.

Suitable hand emergency gear is also provided, and arrangements are being made so that this can be engaged in a few seconds by the manipulations of valves in the steering compartment. There is also fitted an Edison electrotube battery for working the steering gear in the event of a failure of the main generators.

All the galley cooking appliances are electrically heated. Throughout the whole of the accommodation and in the seamen's quarters aft heating is effected by electric radiators. Hot water is supplied to all bathrooms and crew's washplaces by means of Wilson's hot water boilers. A vertical C. 0.2. machine, arranged for multiple effect compression and supplied by Messrs. The Liverpool Refrigerating Company, is fitted in the engine room, and is driven by an electric motor.

The propelling machinery consists of two sets of eight cylinder four-cycle, single acting Diesel engines, the cylinders being 630 m.m. diameter by 1,100 m.m. stroke the engines running at 125 revolutions per minute. The whole of the machinery is constructed by Messrs. Burmeister and Wain of Copenhagen, and is to be fitted on board by Messrs. The Caledon Company at Dundee. Four auxiliary Diesel generators each of 100 kilowatts capacity are fitted for the electrical power required for the auxiliary machinery.

A Pine Lumber Operation in the Philippines

By L. AULD



MAKING a success of a pine logging and milling operation under the American flag, almost within sight of the equator, is the record achieved by Herbert C. Heald, of the Heald Lumber

Co., at Baguio Benguet, northern Luzon, the home of Igorote tribes. Pacific Coast lumbermen may have their operating difficulties, but none can compare with the problem of removing the timber from the Heald concession, on a rugged, canyon-slashed country, which straggles out mile upon mile with a scattered growth of pine.

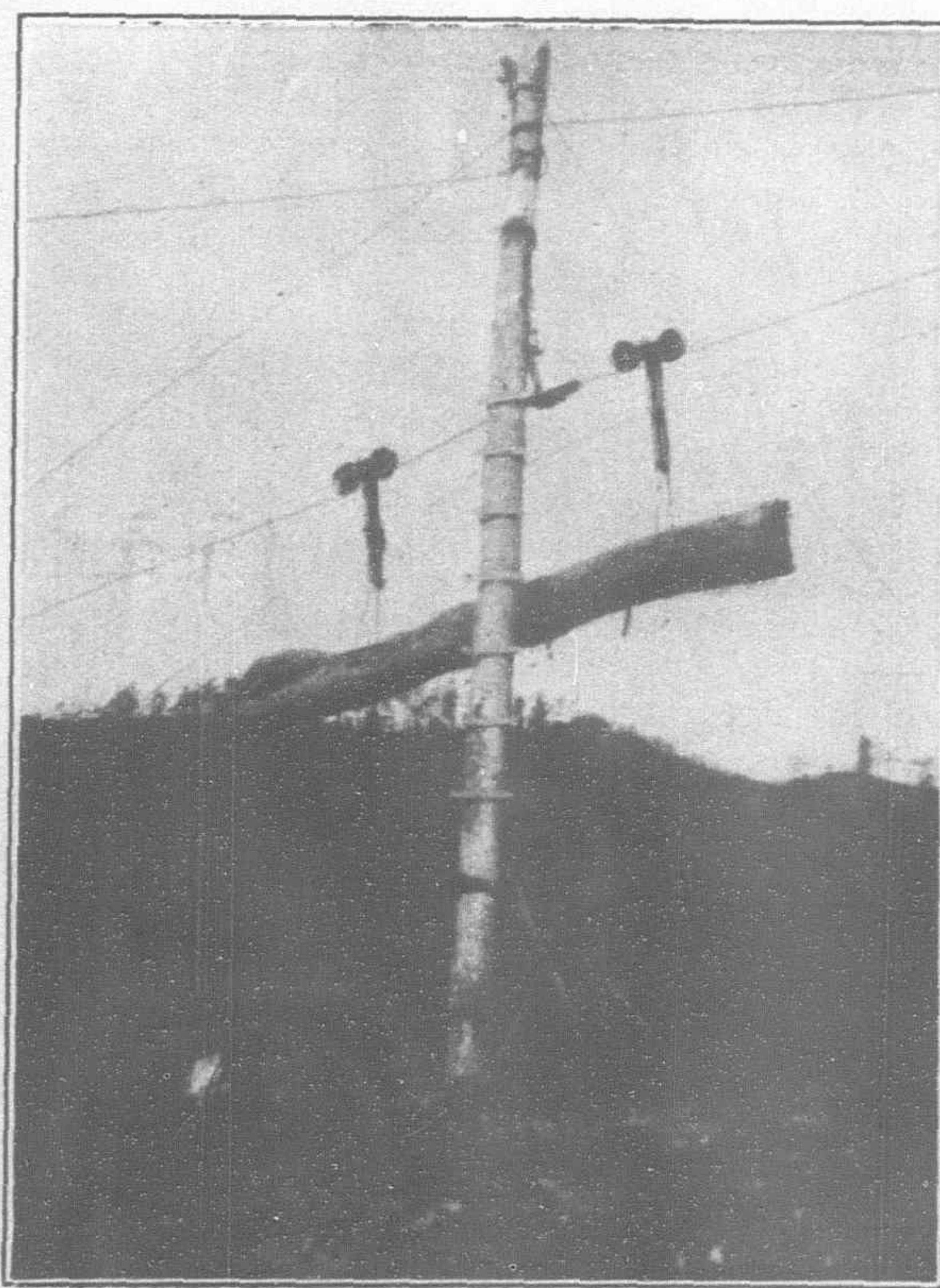
Eight miles of aerial tram which rise from a home station 4,000 feet above sea level to nearly 6,500 feet elevation at the farthest camp, high on the side of Mount Santa Thomas, solve Mr. Heald's transportation problems. This aerial line of frequently shifting cable is one of the longest systems of its kind in the world, as this is written, and may be the longest by the time this article is published. The single heavy main cable loops like a spider's delicate thread from one canyon to another and from one mountain top to the next. In this system there are four spans which measure 3,000 feet or more between stations (a station being a cable support on a hilltop or canyon edge) and varying in height above the ground at their slack from 500 feet to a full 1,000 feet. One of these spans is a genuine feat. It is a mile from one side of the canyon to the other, but the distance between the last cable stations on each side is 4,000 feet. Nevertheless, this is short compared to a new span, now under construction, which will cross a canyon a mile and a half wide and have a main span 5,500 feet long—more than a mile of cable without a single support.

At the camps regular sky line tackle is used, which is in every way similar to those throughout the fir camps of Oregon and Washington. As usual, the cable is lashed to a stripped and heavily guyed tree, and is handled by a donkey engine of small, light proportions. The small size of these donkeys is accounted for in that very heavy ones cannot be brought the six or seven miles from Baguio over the aerial, whereas these light ones are easily transported by this means. The water supplied these donkeys is pumped against a 1,200-foot vertical head.

The Pacific Coast visitor stands watching the operation from one of these terminal camps and can hardly believe he is ten thousand miles from home and under a sky dominated by the southern cross. The donkey whistles; the drums wind in, and over the brow of a little hill three pine logs in a loop of cable come spinning, hesitate above the gigantic pile of jack straws and drop to rest exactly where the engineer has



Bringing in Logs on Skyline to Loading Station—Aerial Tramline



Log Passing Typical Station—Aerial Tramline

decreed. A pause and the logs are free. The donkey begins again to utter imprecations to the blue tropical sky and the line runs back for more logs. From the telephone lines which embrace the entire system to the last detail in method the man from the States feels at home. Even the Heald mill is a replica of several hundred small mills in Oregon and Washington, which cut from 15 to 50 thousand feet per day. One set of circular saws, the old chain system of turning the logs on to the carriage, a single edger, a planer and matcher, a total lack of live rolls and rich yellow sawdust, shavings and the smell of new cut lumber everywhere. Think of any small mill you know, and it will be like the one you are visiting in the far-off mountains of northern Luzon.

However, the illusion of home cannot be maintained in all things. Not even the drizzling rain which blows up in the afternoon, when Santa Thomas is veiled in clouds, can keep it. The lumberjacks alone are a dead giveaway, and where at home do you know of a mill which turns waste stuff into charcoal and converts the rock under its timber stand into lime?

The short study, brown lumber-jacks are Igorotes—tamed wild men. They trot among the silvers, bark and chips in horny, impregnable bare feet, completely trouserless, sockless and shoeless. They will wear a hat and coat; but pants! Nothing doing! Even their dextrous use of ax and peavy do not quite make them the "real thing." The visitor longs for a glimpse of flannel shirt, staggled pants and calk shoes. Just the same, many a logging foreman at home would give much to have a crew of these fellows. They are happy on 50 cents a day wage and a bowl of rice, a sweet potato and a bit of fish is grub fit for a king in their eyes. They are hard workers, very strong, dependable and faithful. One of these sockless cherubs can pick up a 100-pound block, swing it to his shoulder and carry it down the mountain 1,500 feet lower in elevation and back up the other side of the canyon to a point equal in elevation to the place he started from in three-quarters of an hour by actual timing.

Mr. Heald uses Igorotes for his woods crews, with Japanese foremen; these latter because of their comprehension of the English language, energy equal to a white man's and willingness to live in an out-of-the-way place under conditions few white men will put up with. In the mill he employs Filipinos, although they are not very strong and are inclined to be lazy, with all the languor with which the hot sun of the lowlands has endowed them.

There is another thing, so widely different from the marvels of mechanical

(Continued on page 96.)

New Pootung Power Station

AN addition was recently made to the number of electrical Power Stations in the Shanghai district by the opening in November last of the new steam turbine generating station of the Pootung Electric Supply Co.

This power station which replaces the former suction gas power plant of 250 K.W. output, consists of a 600 K.W. 3,600 R.P.M. Brown Boveri generator with surface condenser pumps of the standard mentioned Swiss Manu-

The turbine operates in., 662° F. supplied by two ers of 1,426 sq. ft. heating with natural draught and vision is made for adding economizers.

The vertical direct well as the complete boiler supplied by Messrs. Bab-

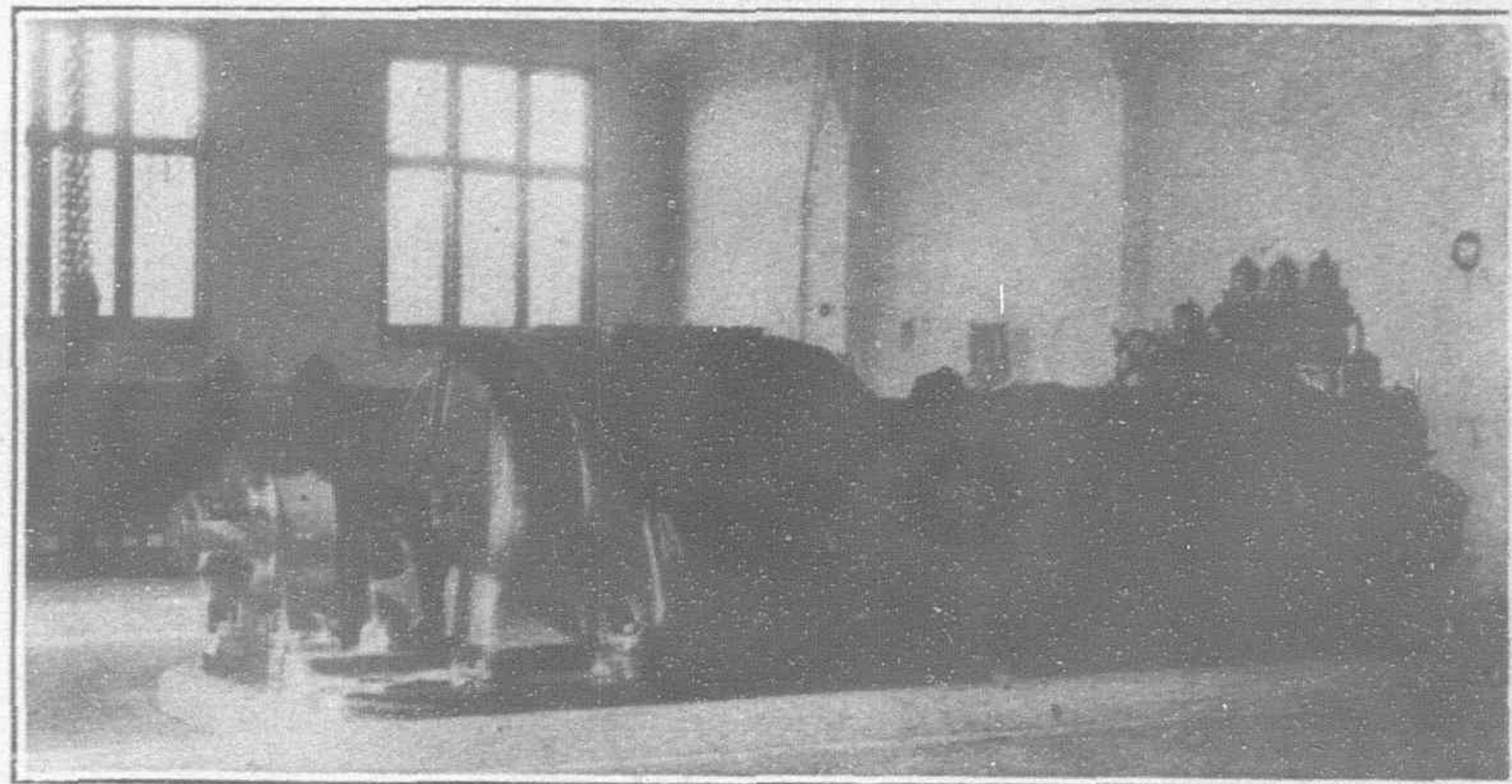
impulse reaction turbo-densing plant and rotary type built by the above-facturers.

on steam at 215 lbs. sq. Babcock & Wilcox boiler surface. The latter work are hand fired, but pro-automatic stokers and

acting feed pumps as room piping was also cock & Wilcox.

cooling and storage pond. During the cold season the lighting peak load can be carried without the addition of fresh water the cooling action at the pond being sufficient.

Owing to the large amount of mud to be expected in the creek water, a two part condenser has been installed, which can be cleaned during service without reducing the load, and with only a small increase in steam consumption during the cleaning process.



Pootung Electric Supply Co., 600 new Brown Boveri Turbo-generator

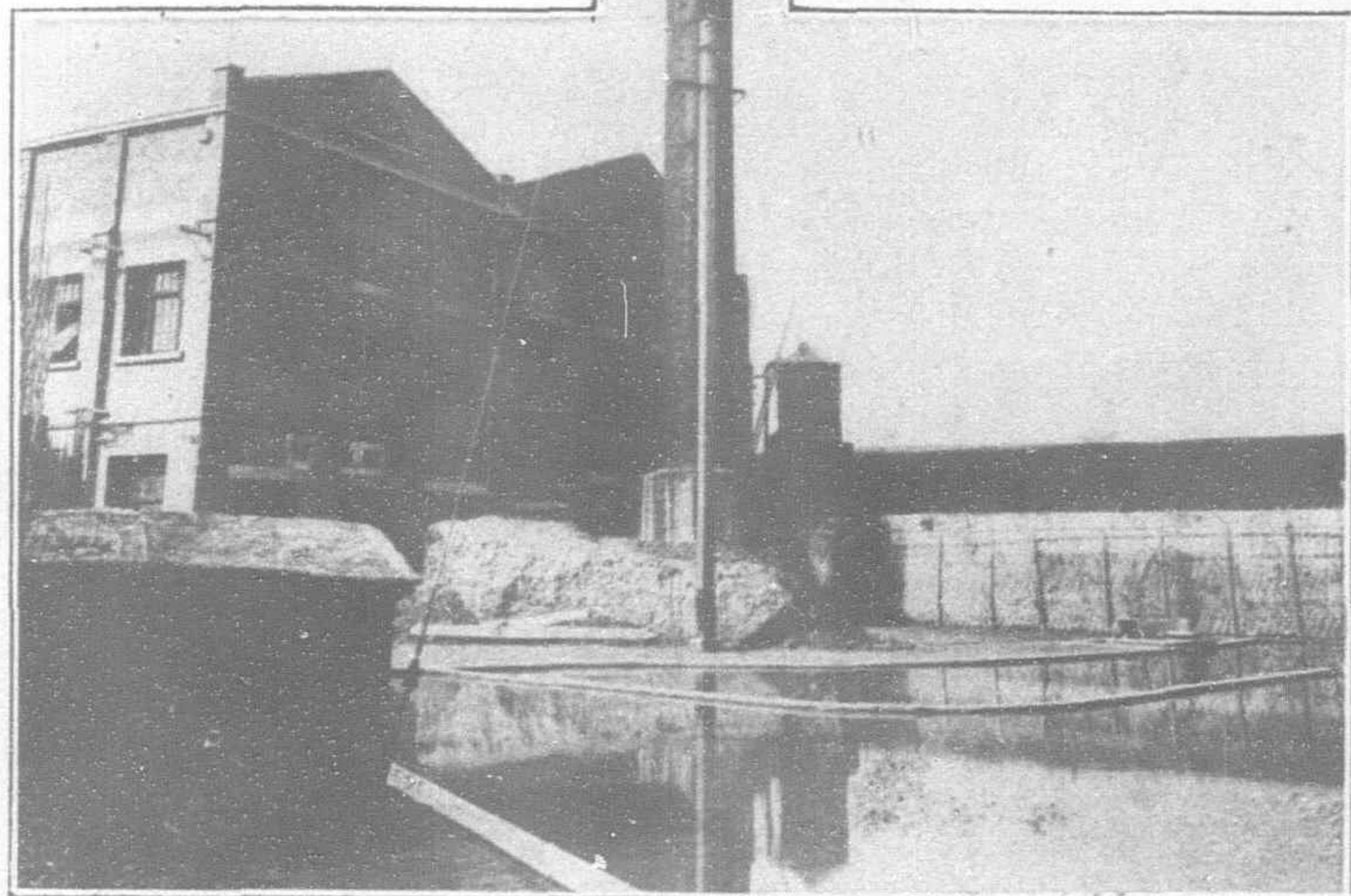
Power is generated at 2,200 volts 60 cycles the tension of the alternator being regulated automatically by means of a Brown Boveri quick acting regulator installed in the switch board, which also contains all the necessary instruments, meters and oil switches for controlling the outgoing feeders.

All the apparatus is mounted in iron faced switch panels. Remote control is provided for the turbine governor.

Careful tests were carried out on this equipment and the steam consumption was found to be at all loads well below the guaranteed figures.

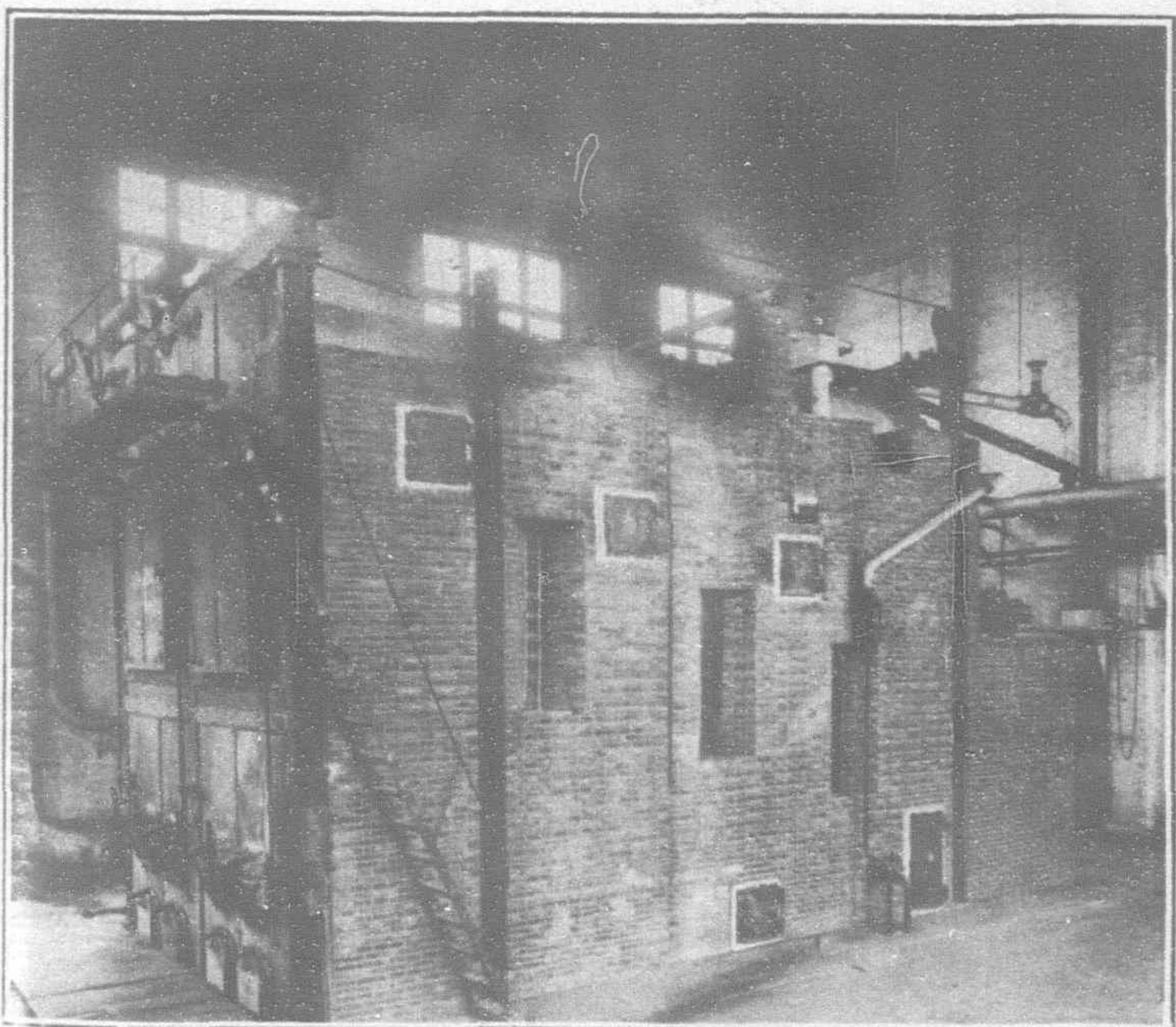
The results of the first month's service have been highly satisfactory the running costs having been materially reduced as compared with the old plant. In spite of the fact that the boiler plant is operated without stokers and economizers, a load of more than 800 K.W. easily carried during the tests so that the overload capacity is very ample.

As a result of the economy realized the Company has announced that the unit prices will be reduced by about 10 per cent.

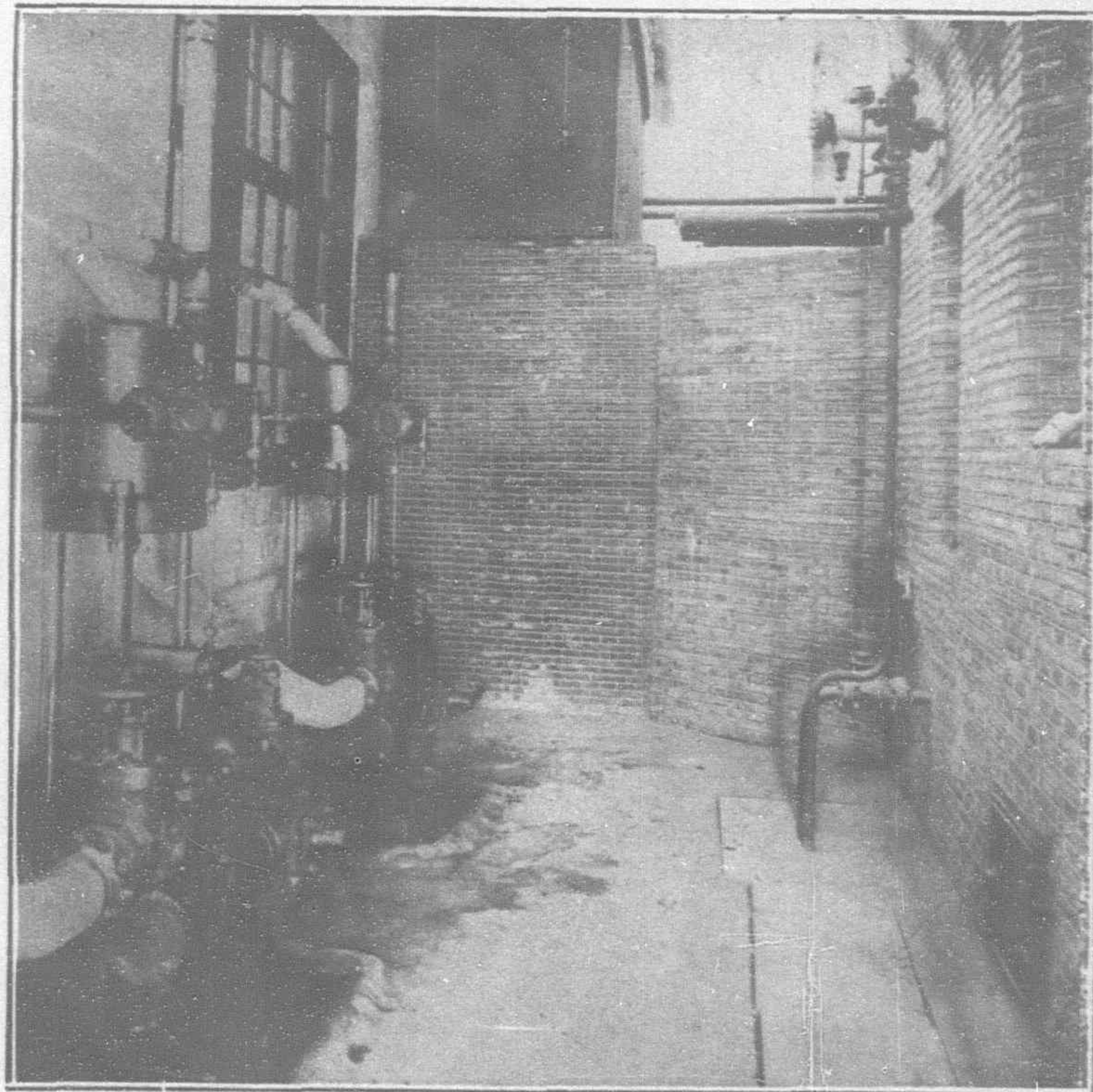


Outside view of Pootung Electric Supply Co.'s new Power Plant, with Circulating Water Pond

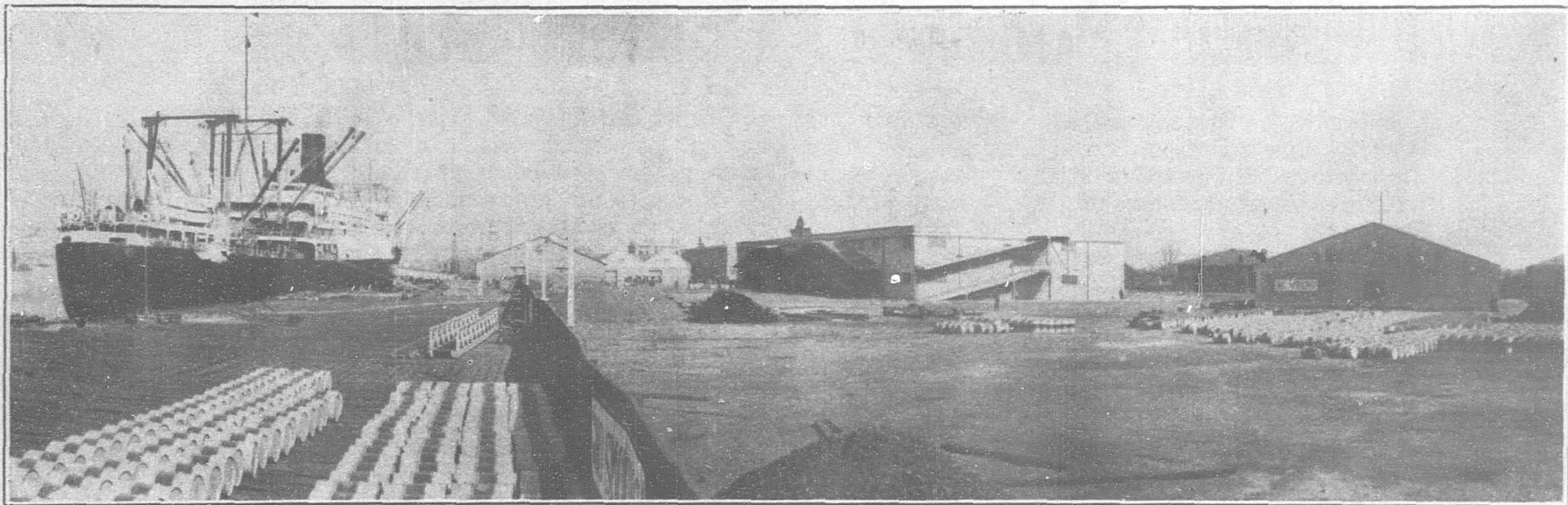
The cooling water is drawn from the Chang Ka Pang Creek by two Pulsometer centrifugal pumps driven by Brown Boveri three-phase induction motors and delivered to a circulating water



Babcock & Wilcox Boiler Plant, Pootung Electric Supply Co.



Feed Pumps and Hotwell Tank, Pootung Electric Supply Co.



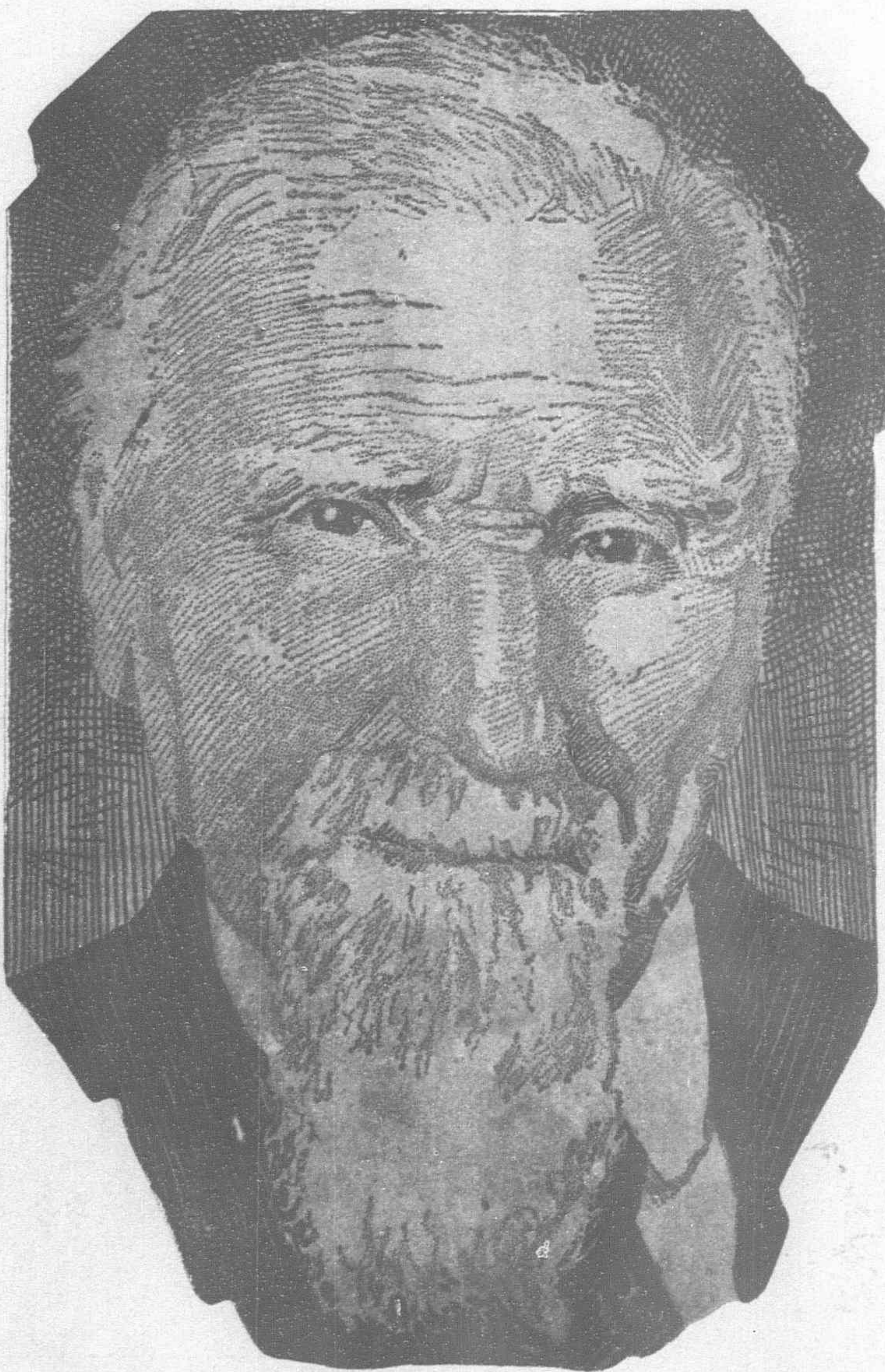
The Dollar Wharf, Pootung, Shanghai

Robert Dollar—and the Dollars on the Pacific

THE most spectacular figure in American shipping circles to-day is Captain Robert Dollar. From a six dollar-a-month job in a stave mill he has risen to become the greatest

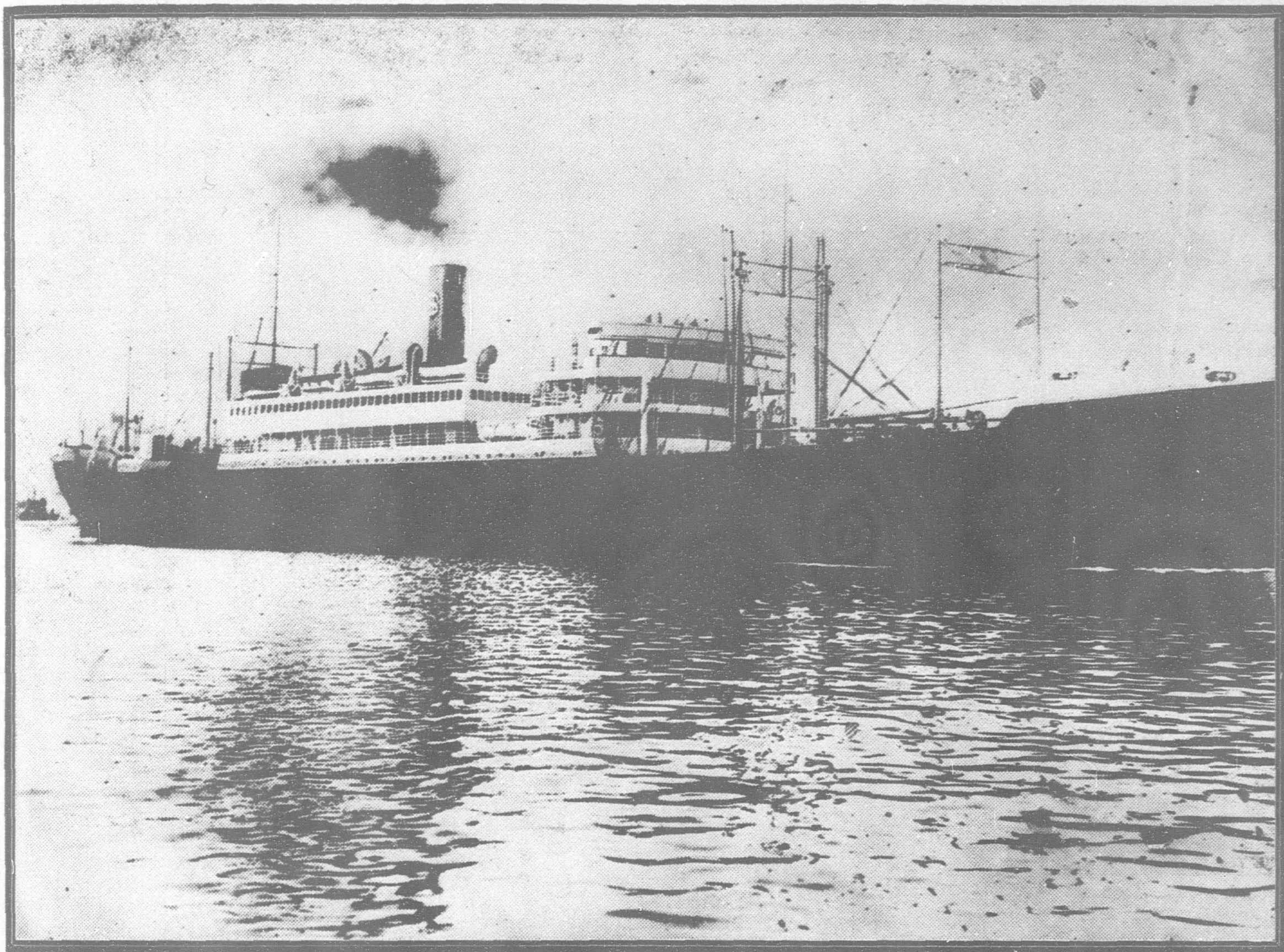
American shipowner, and the story of the intervening years is one of commercial romance, hard, work, dogged perseverance and indomitable courage. In the United States, in Canada, in Europe and in China there are industries and benefactions which bear the name of Robert Dollar, and in twenty-one world ports where his ships call this dean of American shipping men is revered and respected. At the age of eighty-two it is Robert Dollar who is still the dynamic force behind the vast commercial structure which reaches out into practically every country of the world. It is this white-haired, clear-eyed, erect and nimble figure who solves some minor detail with as much earnestness and determination as he tackles the gigantic problem of throwing a line of steamers around the world. It is to his remarkable farsightedness, his keen analysis of conditions, and his tremendous capacity for work that the success of all his enterprises is due. He has extremely able lieutenants in his three sons, Stanley, Harold and Melville. It is no small task for a man approaching the age of eighty to plan and effectuate a round-the-world service, yet this is what Robert Dollar did and to-day his fortnightly globe-encircling service stands as an

international monument to his commercial daring and shipping genius.



Captain Robert Dollar

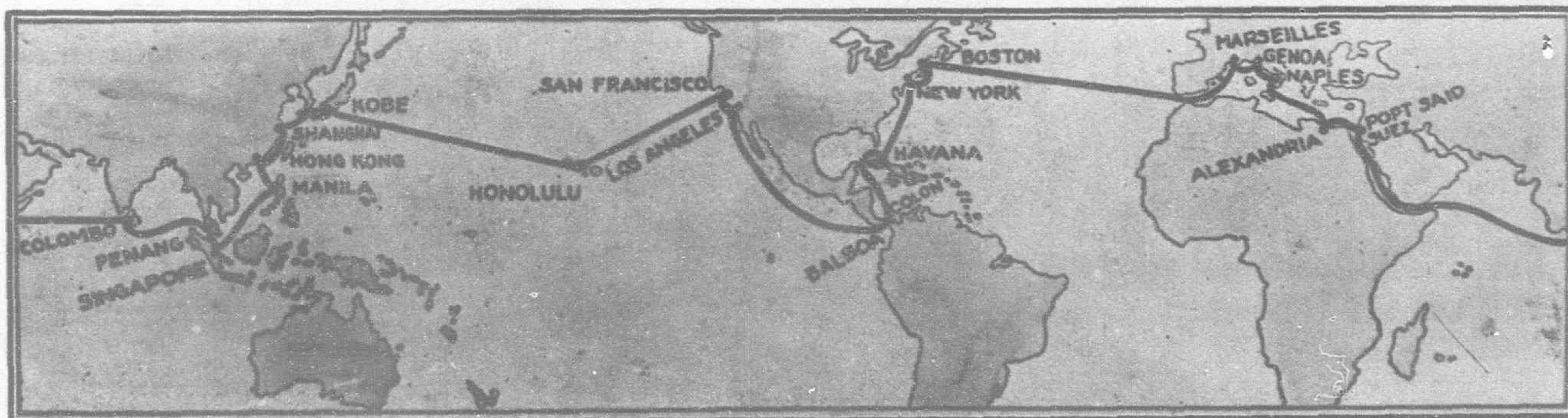
A representative of *The Nautical Gazette* enjoyed the privilege of traveling as a guest of Captain Dollar on the *President Garfield* from Boston to New York and of watching the veteran shipowner in action. Not an operating detail escaped his keen notice and not a phase of the management of the vessel passed unobserved. While the vessel was loading in Boston, Captain Dollar stood near the hatches and carefully watched the process, giving instructions here and there and supervising the work. He moved from hatch to hatch with the nimbleness of a man of half his years and withdrew only after the covers had been battened down. "Work is a pleasure," he said "therefore life to me is one continual round of pleasure." A merry twinkle flashed into his eyes, and almost apologetically he confessed that on his last trip around the world he lost one day without working. "How did that happen, Captain?" he was asked. "I took a day to visit Pompeii and found that business has been suspended there for two thousand years," he replied merrily. When Captain Dollar goes on one of his voyages, it is not with the intention of making it a pleasure trip. To him it is strictly business, and he works as hard when at sea and in a foreign port as when at home. During his trip around the world last year he made 448 calls on business men, and during the

Dollar Line's *President Harrison*

voyage he has just completed he made 481 calls. This reveals his tremendous capacity for work, for, as he says in his memoirs: "A busy day is always a happy day for me."

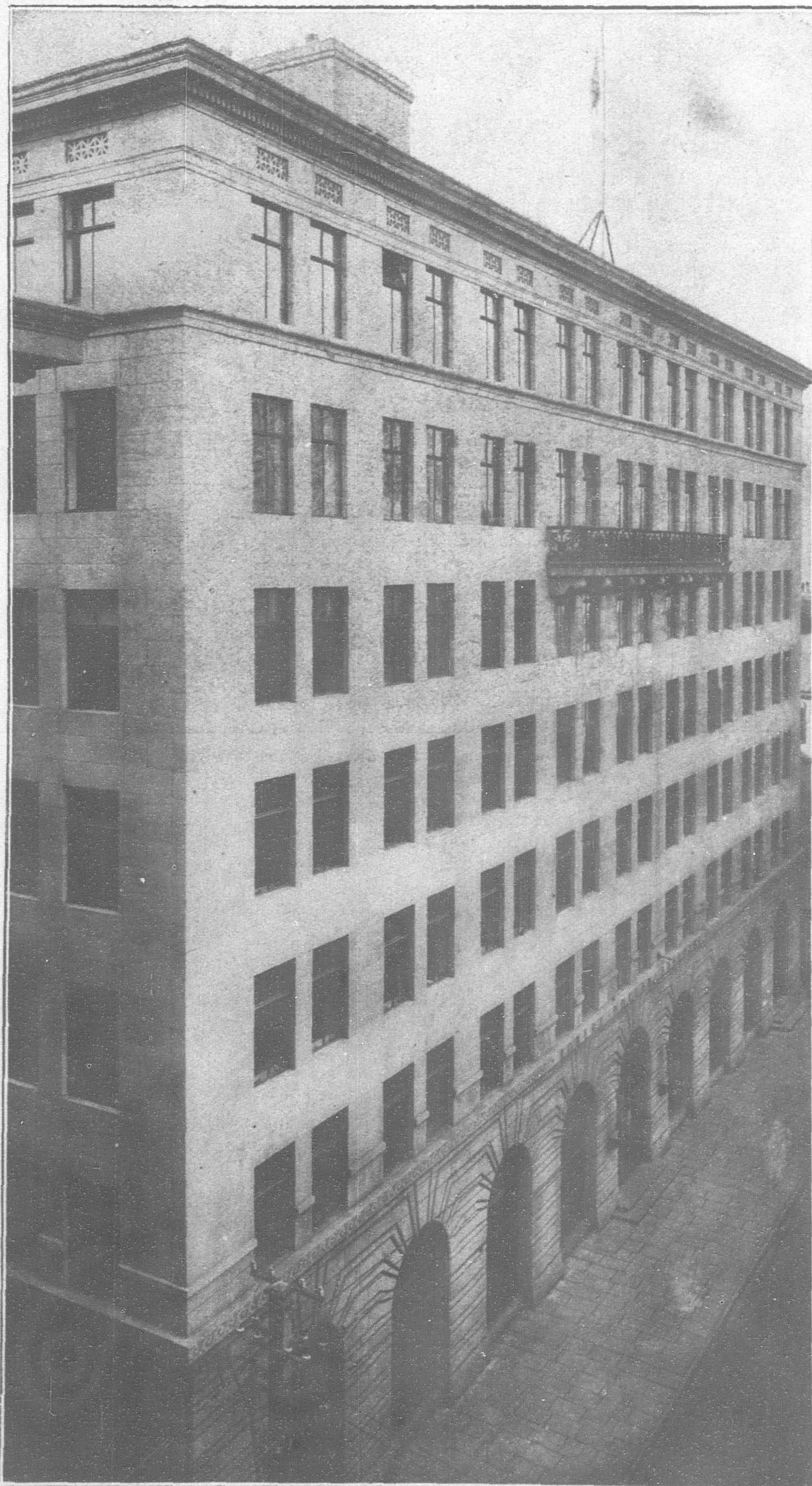
Touching on the question of the future of the American merchant marine Captain Dollar believes that if hampering legislation were removed privately-owned American ships would have a better chance of competing for world trade. "American ships are too heavily burdened with unfavourable legislation," he declared. "The legislative restrictions are so great that if they were all observed fully not an American ship could sail. The half-wage clause in the Seamen's Act should be amended and the captain of a vessel be given discretion as to payments to seamen in foreign ports. The fifty per cent. duty on repairs to American ships effected abroad should be abolished as this is a handicap which seriously increases the operating costs of vessels on long voyages. The hydrostatic test for boilers is a further unnecessary handicap which American ships must carry, and the regulations governing

surveys should be modified." Captain Dollar does not think that a ship subsidy is necessary for the success of the American merchant marine. He believes that the removal of burdensome legislation is all that is required to give American ships a fighting chance on the seas, and that it is essential for American shipping interests to co-operate in the formulation of a constructive shipping bill to be presented to Congress with the unanimous backing of the industry. The "Dean of American Shipowners" is convinced that great good can be accomplished if the English speaking peoples can be brought into closer harmony. He is devoting the latter part of his life to the work of fostering this warmer friendship and better understanding and is of the opinion that any who aid in this great mission is rendering a real service to mankind. "I have only about twenty more years in which to work, therefore, I cannot afford to waste any time," says Captain Dollar, and he is certainly making the best of his remaining years to promote American foreign trade and to develop an American merchant marine.



Round the World on a Dollar Boat

Some people wonder that Captain Dollar can fill the dual rôle of lumberman and shipowner. He gives away the secret when he says, in his memoirs: "With me, shipping has been the natural outcome of lumbering. Thirty-five years or more have passed since I reached one of the most important decisions of my life. I wanted to increase my lumber business through unrestricted export. The only way I could possibly hope to do this profitably was to transport my lumber on my own ships. I bought the *Newsboy*, a small schooner with a capacity for 250,000 feet of lumber. That was my first venture into shipping; it turned out well and I bought more boats as they were needed. I started life as a woodsman. I soon learned that in order to succeed a man must know more than one thing thoroughly. Many years have passed since I started looking away from the woods, to the source of demand in the world markets. I found plenty of sale for my lumber and built up a steamship company as well. I knew that if I had only concerned myself with the cutting of trees and not the ultimate sale of those trees, I would never have advanced far. But when I found how much lumber was required by merchants in the Far East, mine operators close to the Mexican border, and builders in the West and Middle West, I began to get somewhere. As the years advanced, and I got deeper into the old problem of supply and demand my business just naturally grew and I found myself, though still a lumberman, a shipowner as well. But I have always tried to keep to the simplicity of life that exists among the folk who fell the forests. At heart I am still a woodsman. I love the boom of the logs and the ring of an axe far more than the rush and roar of cities. There is also great peace of mind to be found during long hours at sea, when the steady throb of an engine turning a hundred revolutions a minute is the only sound to be heard. Because I love both the wooded places and the sea, I do not find it hard at any time to turn from one to the other."



The Dollar Building, Shanghai

Captain Dollar's understanding of the problems of the Pacific are perhaps nowhere so clearly stated as in an interview with an American newspaper in which, having been asked as to the possibility of war between Japan and the United States, he replied:

"There is no danger," he said. "There is no possibility of war."

"And you are betting your money, in trade expansion, shipping bases and so on, that there is to be peace in the Pacific."

His face hardened. He is a strict Presbyterian.

"I am not in the habit of betting," he said, reprovingly. "We are certain that there will be no war. If I thought there was I'd be the first to get ready for it. I'm preparing for peace."

In his opinion the present disorders in China might be compared to a war between States of the Union. He has the greatest admiration for the Chinese and believes that ultimately they will work out their problem of harmonizing the warring provinces. They seldom allow the sectional wars to interfere with trade. Capt. Dollar said that he has yet to be cheated by a Chinese or to find a bad debt.

"The trouble in China has been going on for the past twelve years. It can be solved only by themselves."

"How?"

"By a strong man, a dictator who will set up a strong Government."

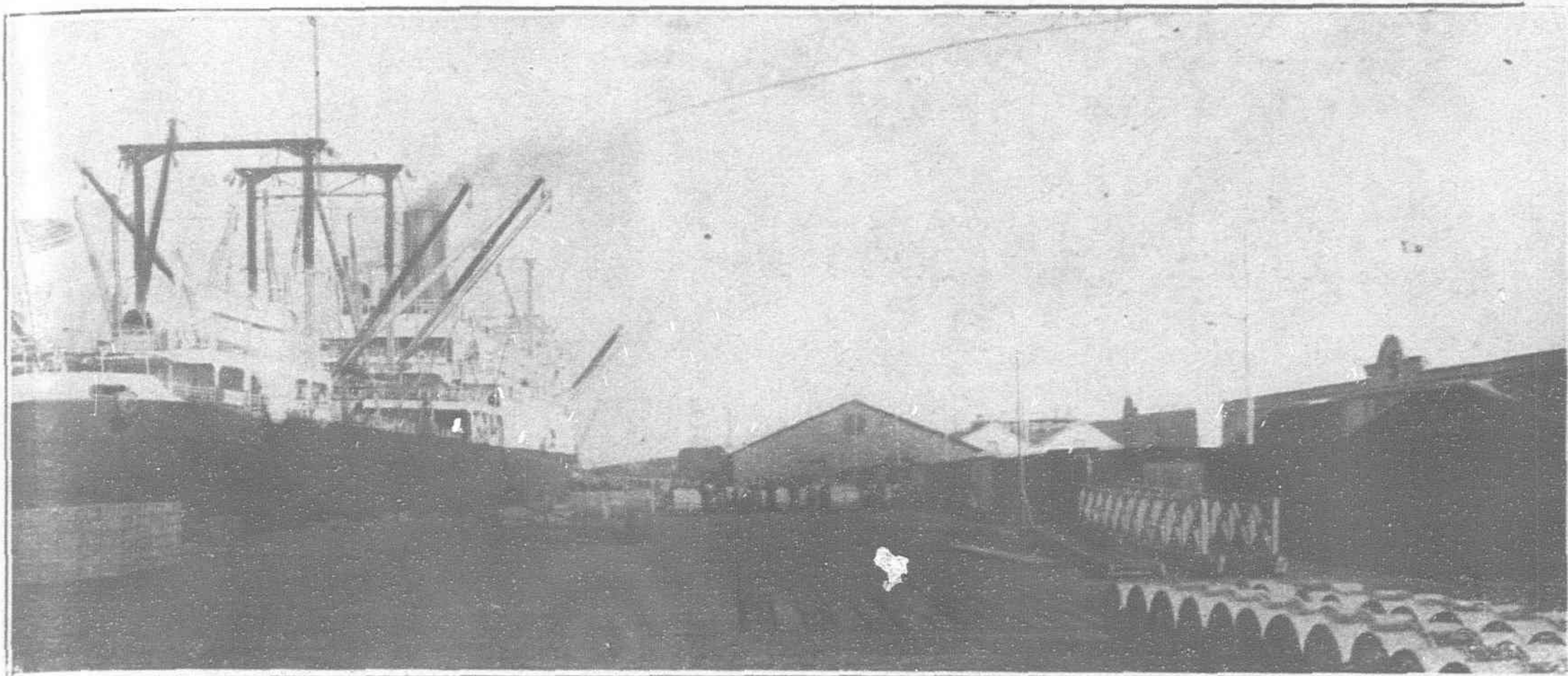
"And can foreign powers help?"

"No, it would be just like stopping a man who is beating his wife."

"The United States and Great Britain are working hand and glove in foreign relations," he added. "And that is as it should be."

"And with regard to Japan, is there much bad feeling left as a result of the passage of the exclusion provision of the Immigration Law?"

"There is absolutely nothing there. The Japanese and many Americans who know conditions in the Pacific, thought that it should have been done diplo-



Tying up at the Dollar Wharf

matically. It hurt their feelings some, but now there is no ill-feeling that could lead to war."

Stanley Dollar, who has been Captain Dollar's chief lieutenant, is still a young man, with all the "pep" and go of the coast executive, a strong, positive type of person, but with the saving grace of humor and plenty of channels for his active mind. The three sons of Capt. Robert Dollar were brought up to the responsibilities of the big family fortune and the sources from whence it was derived—lumbering, shipping and trade. Of these sons Stanley Dollar made himself the most conspicuous for achievement such as the world hears about. He is in every respect his father's son, blessed with his father's initiative and the farsightedness and vision that makes big ventures a success.

This was illustrated when he came to assume control of a large part of the Dollar enterprises, to relieve his father of many of the burdens that the big growth of their affairs and advancing years had placed upon him. Stanley Dollar was not content with that. He sought to carve his own way also. In 1920 he became an important factor in a big coastal steamship company which was reorganized and infused with new blood—a company in whose affairs he still participates, though retaining his executive positions in his father's companies.

A year later the U.S. Shipping Board determined to lay out a steamer service between Seattle and the Far East, with a fleet of five 22,500-ton ships. He was requested to operate this line and accepted the responsibility. To this end the Admiral Oriental Line was organized and still conducts this service. In 1923 the seven 21,000-ton ships were acquired from the Shipping Board and the round-the-world service inaugurated by him. This step was regarded in shipping circles as one of the most venturesome ever undertaken and many of the old experienced shipping men were convinced in advance of its failure. But it succeeded, thanks to the driving

power of the head of the line, plus the intimate knowledge he and his organization had acquired of the necessities and mutual obligations of Oriental trade. It must likewise be said that Pacific coast shippers have responded to the patriotic element involved in patronizing American ships to an extent that seems remarkable here in the East.

The Dollar interests have been more active in China than in other places, as much from sentimental as business reasons under the management of J. Harold Dollar, the Dollar interests in Shanghai have become pre-eminent among American activities. The Dollar Building on Canton Road, the Dollar

Wharf at Pootung and the Dollar Apartments on Avenue Joffre are indications of the permanence of the Dollar organization in China.

The Dollar Company maintains a modern wharf and godown plant in Shanghai, generally known as the Pai Lien Chien Wharf. Every facility required by shippers in the way of receiving, storing and delivering of cargo may be obtained. Immense godowns, thoroughly fireproof and of latest modern construction, with a capacity of 60,000 tons, are available for the use of ordinary cargo. Also specially constructed godowns, with a capacity of 3,000 tons, licensed by the Maritime Customs, for the storage of hazardous cargo. The wharf is 1,500 feet long and is equipped with an up-to-date travelling locomotive crane Brown Hoist Co. (American), capable of lifting 20 tons. The track extends along the wharf and on to the property 500 feet. Anyone interested in the operation of a modern plant of this character will do well to visit the Pai Lien Chien Wharf. Two of the 535 Shipping Board vessels can berth at the Dollar Wharf at the same time.



Unloading at Pootung

Large Japanese Electrical Order

It has just been announced that the Metropolitan-Vickers Electrical Company of Manchester, have secured a considerable order in connection with the extension of the Amagasaki Power Station in

Japan, for the supply of a 40,000 k.w. turbo-alternator set running at 1,800 revolutions per minute, and delivering current at a frequency of 60 periods. Two 35,000 k.w. sets running at 1,500 revolutions per minute, and supplying current at 50 periods have been ordered for the new Tsurumi Station, situated in the Tokyo district of Japan.

The New Baldwin 1,000 h.p. Diesel Electric Locomotive

THE New Baldwin Locomotive combines, for the first time in a locomotive of this size, the attractive fuel economy of the Diesel engine with a compactness, simplicity, and arrangement of equipment conforming to the railroad man's idea of a practical locomotive.

The result of extensive research and experimentation to fulfill the railroad's requirements for a reliable self-contained unit having low operating cost, and capable of running long periods without replenishing fuel or water. Meeting, in its present capacity, the definite need for a new type of locomotive to handle branch or connecting line service, switching, terminal and special transportation problems which heretofore have been difficult to solve

General Specifications

Track Gauge, 4-ft. 8½-in.; Diesel Engine: Cylinders, 12; Diameter and Stroke, 9½-in. by 13½-in.; Horse Power, 1,000; Type, 2-Cycle, Solid Fuel Injection; Electrical Equipment, Westinghouse; Number of Motors, 4; Type, Railway 353-D-3; Voltage, 750 D.C.; Driving Wheels, Diameter, 40-in.; and Journals, 7½-in. by 14-in.; Idle Wheels, Diameter, 40-in.; Wheel Base—Truck or Rigid, 12-ft. 8-in., Total 38-ft. 4-in. Overall Dimensions: Length over Couplers, 52-ft. 1¾-in.; Length over Cab, 34-ft. 4-in.; Height, 14-ft. 7-in.; Width over all, 10-ft. 5-in.; Width Inside Cab, 10-ft. Weight, Total, 275,000 lbs.; On Driving Wheels, 180,000 lbs.; Starting Tractive Force, 52,200 lbs.; Capacity of Fuel Tank, 75 gals.; equipped with Air Brakes, Air Sanders, Electric Headlights and Automobile Couplers.

The Electrical Equipment

Direct connected to the Diesel engine through a flexible coupling, is a specially designed self-ventilated direct current generator

and exciter of very rugged design to meet steam railroad requirements.

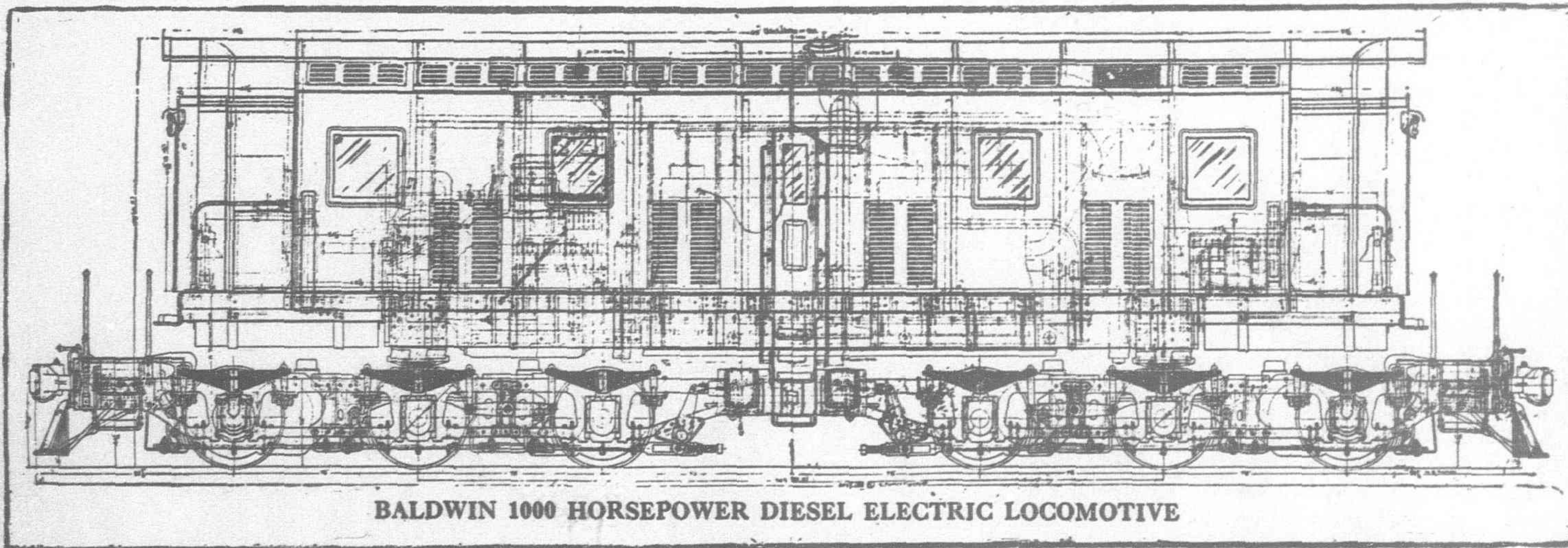
The electrical design of this self-contained unit is such that automatically a constant horsepower is drawn by the traction motors over a wide variation of locomotive speeds, resulting in maximum torque being exerted during the entire acceleration period, while maintaining constant load on the engine.

Four Westinghouse Type 353-D-3 standard railroad type, self-ventilated motors are used, one mounted on each of the outer axles of each truck. As in latest electric locomotive practice, these motors are geared to the driving axles through flexible gearing.

The control equipment, which is of the Westinghouse electro-pneumatic and magnetic type, is arranged for double end operation of the locomotive, and is readily accessible for inspection and maintenance. The locomotive is accelerated from standstill by the manipulation of a master controller, which controls the speed of the engine and the output of the generator.

With the engine running at idling speed, the motors are first connected to the generator and then through increased excitation of the generator fields, the voltage is raised so that the motors accelerate the locomotive, using the maximum output of the engine at this speed. Further acceleration by increasing the voltage to the motors is accomplished by increasing the engine speed up to the allowable maximum speed of the engine by manipulating the throttle. Smooth acceleration is thus obtained and maximum tractive effort up to the slipping point of the drivers can be maintained.

The control, which is extremely simple, has demonstrated that an engine man can master the operation of the locomotive in a few hours' time.



BALDWIN 1000 HORSEPOWER DIESEL ELECTRIC LOCOMOTIVE

New Hydro-Electric Scheme for Perak

The Federated Malay States Government has signed a concession under which rights are granted to Sir W. G. Armstrong, Whitworth & Co., Ltd., to develop a hydro-electric power scheme on the Perak River in the State of Perak.

It is intended that the power so obtained shall be principally applied in the development of the Kinta Valley and neighbouring tin fields, situated in the same State, and in cheapening the cost of production in that area.

The scheme will involve the purchase in England through Messrs. Armstrong, Whitworth of a large quantity of material

including machinery and electrical material, and it has the support of the Trade Facilities Act Advisory Committee to the extent of \$1,250,000 guaranteed.

Writing on the subject of the concession the "London Times" says:—"Perak is noted both for its production of tin and rubber and Kinta is one of the chief mining centres. Tin was discovered in Perak about 1850, and was followed by the immigration of a large number of Chinese. Since the establishment of a British Resident development has been marked. A British company has been working successfully the tinfields of the Kinta district for the last 25 years, and another British company has a large area under rubber."

The Osaka Harbor

FOR both domestic and foreign commerce, the port of Osaka is one of the most important ports in Japan, it is the principal distributing center for all kinds of native produce. It has been, however, found increasingly unsatisfactory to accommodate large vessels as the time goes on. What makes the condition worse is that the harbor which spreads out in the western direction had been exposed to wind and waves, and that little improvement was effected in the dredging at the mouth of the river, where there is a constant accumulation of sand. Furthermore, the width and depth of the river was found so small that no vessel of larger type was able to pass. Under these circumstances, it was early advocated to improve the harbor. Although the scheme often received a set-back, in 1900 the Osaka Municipality decided to carry out the harbor construction, unexampled in its scale in Japan, and supported by the state subsidy on October 17, in the same year, the ground-breaking ceremony was held in the compound of the old fort of Temposan, the foundation stone being laid by the late H.I.H. Prince Komatsu.

The original plan was to complete the work within a period of eight years with a cost of Yen 18,128,000. But owing to the economic change after the Sino-Japanese war which caused the rise in prices of materials and high wages and the unsatisfactory result of the loan floatation, the estimated cost was found to be insufficient. Accordingly in 1904, supplementary Yen 9,200,000 to the original estimate, they extended the period for construction a further ten years. In the course of the work, however, the authorities met with other economic difficulties arising out of the Russo-Japanese war, and according to the financial condition of the Municipality, it seemed quite impossible to bring the whole work to completion by 1915, the time limit.

In 1916, the Osaka Municipality entrusted the construction work of No. 1 dock as well as a mooring-pier to Baron Kichizaemon Sumitomo. The contract has been concluded between both parties on the condition that the cost amounting to some Yen 1,500,000 be paid by the Municipality to the Sumitomos after twenty years

and that during that space of time, the Sumitomos be allowed to use the said pier and the lot in its rear covering about 20,000 *tsubo* in area to operate warehouses.

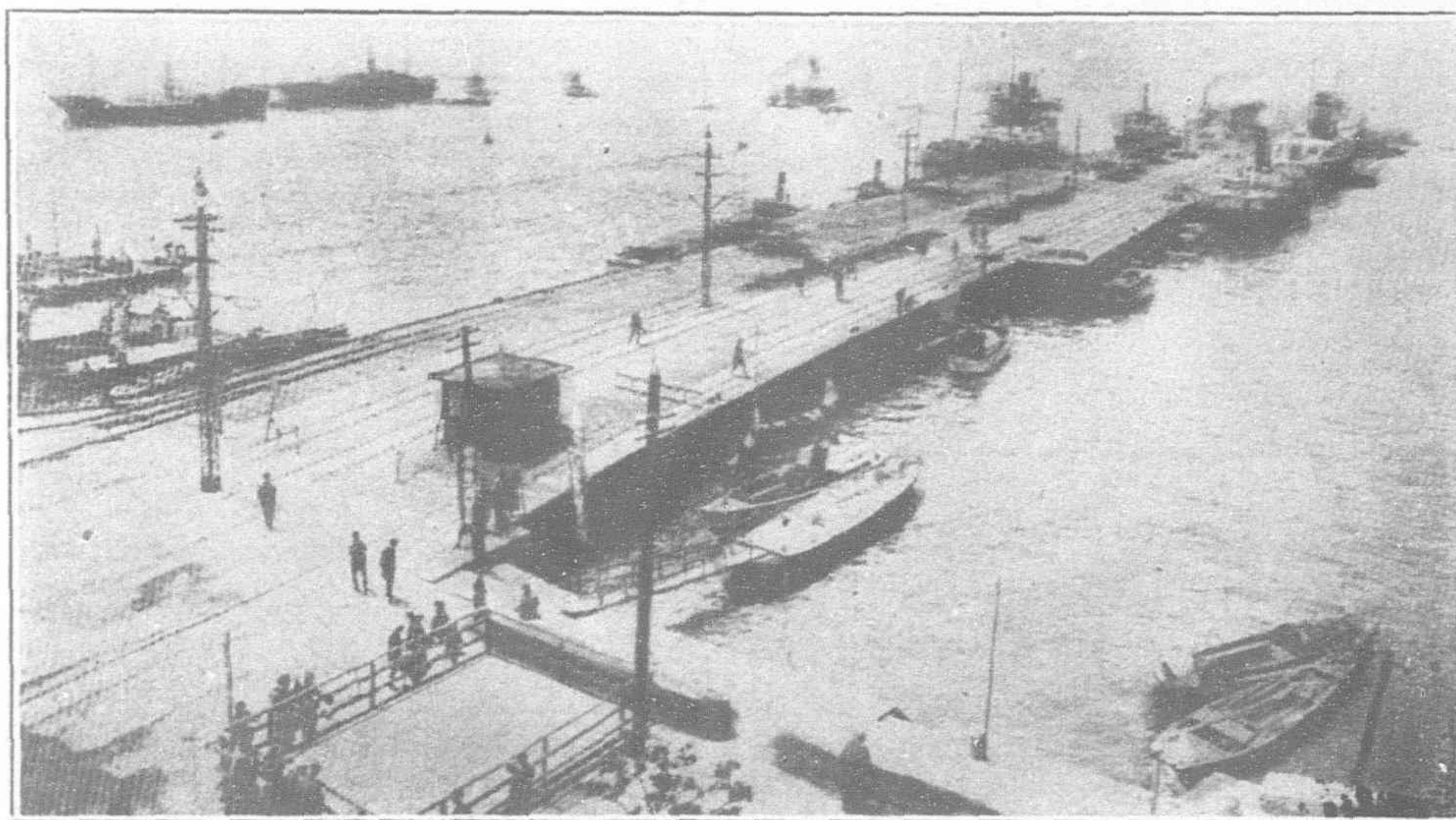
In the following year, because of the Great War, the commerce and industry of Osaka showed a remarkable expansion, followed by the congestion of vessels and freight which gave impetus to the utilization of the harbor. Then, the Government passed the plan for construction of the harbor railway which had been a long-pending question. It was keenly felt to complete the communication facilities by land and water at full speed. As the financial condition of the Municipality fortunately showed signs of making a better turn for the future, they appropriated Yen 8,224,000 for the expenditure for the remaining work and its necessary equipments and started the work as planned to complete it within the period of six years starting from 1918.

However, owing to the great change of the economic problems during the Great War, the builders were again faced with the difficulties arising from advances in prices and wages. Finding it impossible to carry on the work as planned, they have increased the cost of the construction work entrusted to the Sumitomos to Yen 3,106,000 and the cost for the work under the direct control of the Municipality, to Yen 15,750,000 respectively. The

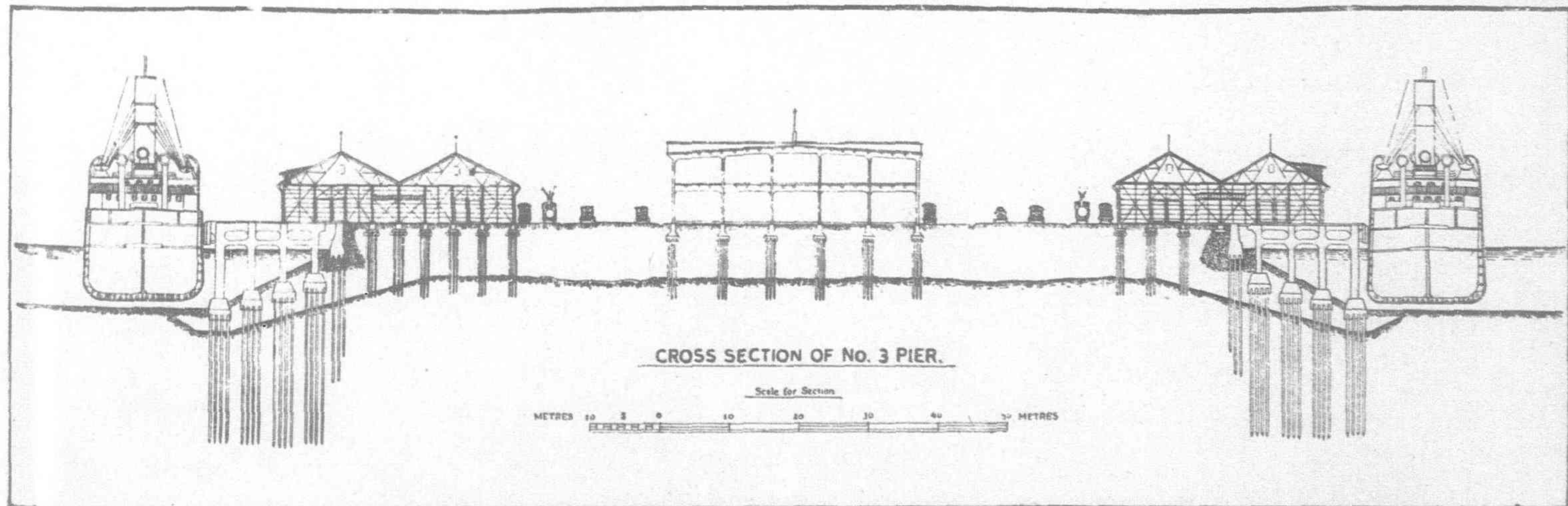
period at which the work is to be completed has been extended to the fiscal year of 1926, and having been granted the state aid against a part of the increased cost, the work is now in progress.

The scheme has been drawn up for the reclamation work of the land covering some 150,000 *tsubo* in area which is to surround the proposed moorings in front of Sakurajima reclaimed land which is so narrow that it cannot meet with increasing shipping requirements. The ground having been broken on March 31, 1924, it is in course of construction. The work is expected to be completed within a period of five years at the estimated cost of Yen 2,760,000. In connection with this work, some of the Osaka citizens have in contemplation to make the Shorenji river join the harbor.

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An Osaka Pier





Thus, the total amount of the cost for the harbor construction to be spent by the Municipality up to the end of 1926 will reach Yen 44,500,000 and adding its interest to the above figure, it would come up aggregately to the tremendous sum of Yen 82,600,000.

HARBOR EQUIPMENT.

Breakwater Name	Length Ken*	Width Shaku†	Average Height Shaku	When work Started	When Completed
Southern Breakwater	2,438.8	18	9.5	Jan., 1898	July, 1904
Northern Breakwater	1,519.7	6	8.5	Oct., 1899	July, 1904
Extension of the above	812.0	—	13.5	Jan., 1904	Mar., 1909
Breakwater of Inner Harbor	820.0	18	13.5	Oct., 1897	Dec., 1902

AREA OF HARBOR

The total area of the harbor which is embraced by both south north breakwaters is about 1,980,000 *tsubo* or 25 sq. miles and 337 acres.

DEPTH OF WATER

The depth of water in the area covering about 950,000 *tsubo* or 1 sq. mile and 136 acres in the harbor keeps 29 shaku 5 sun on average at ebb-tide.

EBB AND FLOW OF TIDE AND NATURE OF SOIL AT BOTTOM

The position of the tide is as high as 6.75 shaku at its highest and 4.75 shaku on average at full tide, while it is 1.75 shaku at its lowest. Therefore, the harbor is capable of allowing vessels of 10,000 tons class to lie at anchor. Moreover, the nature of the soil at the bottom being mud, it is suitable for the moorings of vessels.

The Number of Vessels which entered and cleared at this port since 1904 were :

Year	Steamer		Sailing Ship		Total	
	No. of Steamers	Total Tonnage	No of Vessels	Total Tonnage	No. of Vessels	Total Tonnage
1904 ..	383	863,065	3	1,218	386	864,283
1913 ..	1,816	3,826,786	742	113,606	2,558	3,940,387
1914 ..	2,092	3,967,660	454	43,414	2,546	3,528,165
1919 ..	4,272	4,489,987	1,081	114,674	5,353	4,604,661
1920 ..	4,295	4,983,137	1,290	123,217	5,585	5,106,354
1921 ..	4,305	6,442,818	1,420	154,599	5,725	5,957,417
1922 ..	11,230	11,920,920	1,485	158,504	12,715	12,079,424
1923 ..	14,387	16,176,159	1,610	139,932	15,997	16,316,091
1924 ..	17,018	21,055,882	2,090	167,355	19,108	21,223,237

The above vessels will be classified into two, Japanese and foreign as follows :

Steamers

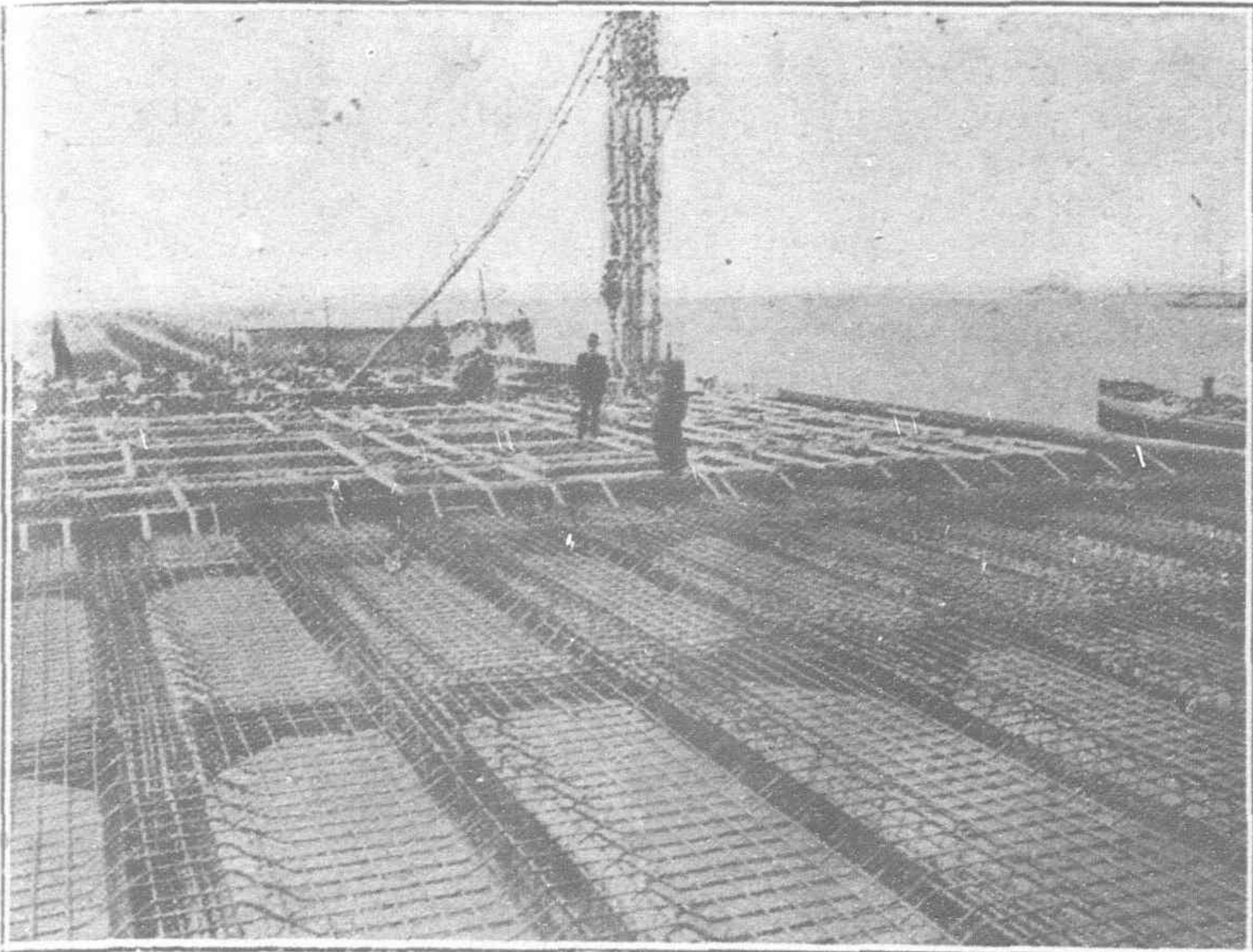
Year	Japanese		Foreign	
	Number	Total Tonnage	Number	Total Tonnage
1913 ..	1,783	3,642,592	33	184,189
1914 ..	2,059	3,354,409	33	130,342
1919 ..	4,241	4,411,355	31	78,632
1920 ..	4,280	4,923,249	15	59,888
1921 ..	4,277	6,345,841	28	96,877
1922 ..	11,164	11,626,867	66	294,053
1923 ..	14,219	15,294,018	168	882,141
1924 ..	16,703	19,435,422	315	1,620,460

Sailing Vessels

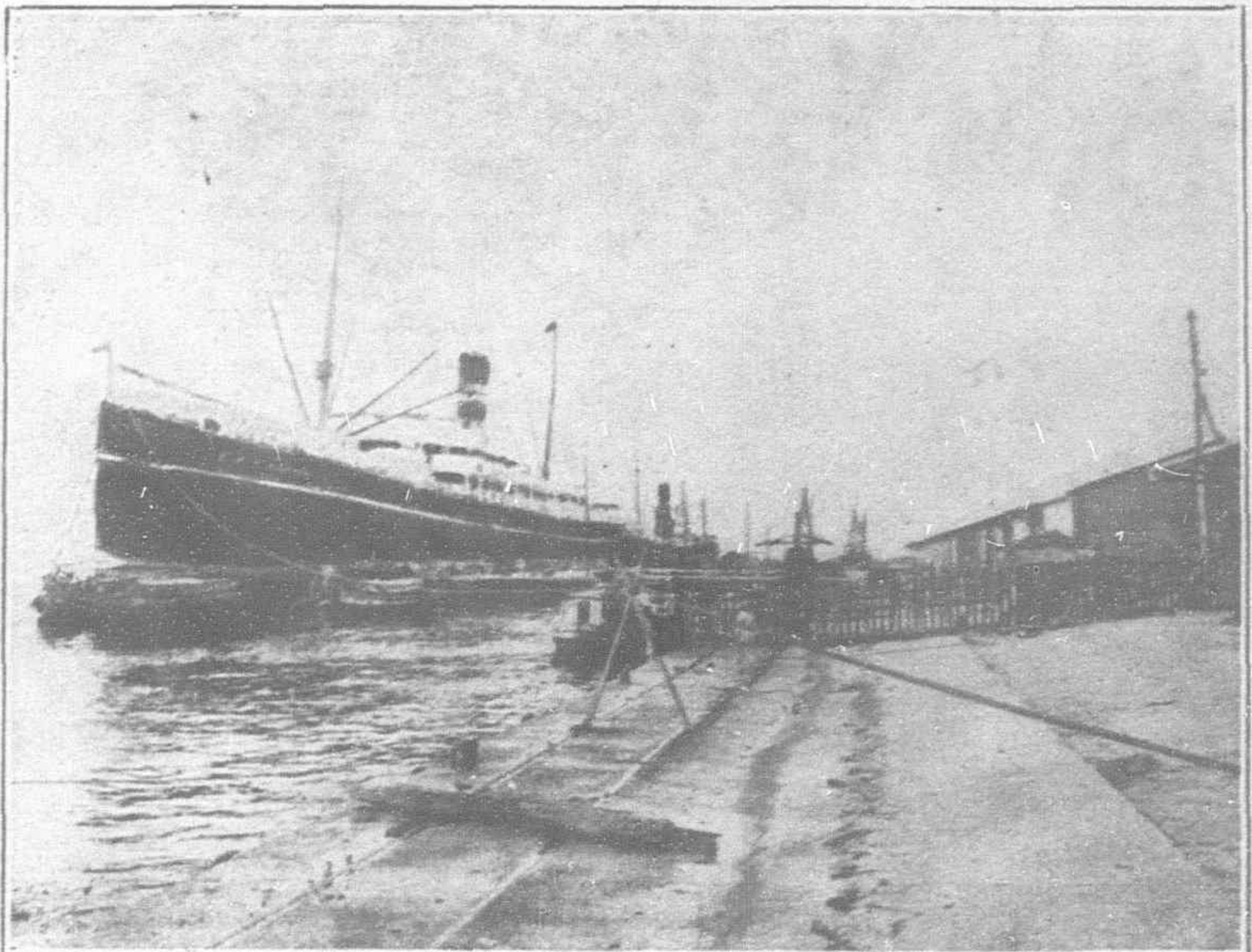
Year	Japanese		Foreign	
	Number	Total Tonnage	Number	Total Tonnage
1913 ..	742	113,606	—	—
1914 ..	453	42,593	1	821
1919 ..	1,081	114,674	—	—
1920 ..	1,290	123,217	—	—
1921 ..	1,420	154,599	—	—
1922 ..	1,482	150,600	3	7,904
1923 ..	1,610	139,932	—	—
1924 ..	2,090	167,355	—	—

*One Ken equal to 5.965164-ft.

†One Shaku equal to 0.994194-ft.



Wharf under Construction



Sakurajima Pier

The quantity of goods imported and exported through this Harbor was :

Exports.			
Year	To domestic ports	To Korea	To foreign countries
1913 ..	278,788	140,446	117,322
1921 ..	294,890	110,936	381,978
1922 ..	295,272	124,914	434,518
1923 ..	678,348	205,432	452,121

Imports.			
Year	From domestic ports	From Korea	From foreign countries
1913 ..	730,383	139,032	379,946
1921 ..	1,192,101	302,033	911,851
1922 ..	1,238,037	403,164	1,390,112
1923 ..	1,317,606	372,259	1,972,388

The following are the Osaka Piers :

Name	Length ken	Width ken	Height shaku	Depth of Water shaku	Built of Iron
Main Pier ..	250	15	10.5	31.5	do.
T type pier ..	17.5	2.5	10.5	27.5	do.
Sakurajima Pier ..	40.0	6.0	9.5	29.5	do.
Sakurajima Pier ..	70.0	6.0	9.5	29.5	do.
Sakurajima Side Pier	203.0	4.2	5.5	14.5	reinforced concrete
Tenpozan Pier ..	70.0	5.0	8.5	19.5	do.

The above mentioned piers are at present open to the public free of charge.

Tenpozan Pier is for the exclusive use of passengers. Main Pier is intended for the use of both passengers and freight, while the other piers are used only for freight.



Bird's-eye View of the Business Centre of Greater Osaka

The harbor equipment under construction.

The following are the principal equipments for which works have been started since the fiscal year of 1918.

MOORING QUAYS

Name	Length ken	Width ken	Area tsubo
No. 2 Mooring Quay	200	55.0	11,000
No. 3 Mooring Quay	200	83.3	16,660

PIERS

Name	Length ken	Width ken	Height of Pier shaku	Depth of Water shaku
No. 1 Dock, North side ..	240	12.7	11.5	29.5
do South side ..	200	12.7	11.5	29.5
No. 3 Pier, North side ..	200	12.7	11.5	29.5
do South side ..	200	12.7	11.5	29.5

The latter three piers are under the direct management of the Municipality, while the former one is entrusted to the Sumitomos for its management.

LANDING PLACES

Name of Place	Length ken	Depth of Water shaku	Remarks
The points of Nos. 1 and 3 piers ..	145	8.5	Reinforced concreted levee.
Minami-Kaigan-dori 2 chome and 3 chome	260	8.5	

RECLAMATION WORKS

Name of Place	Area tsubo
Right bank of the Ujikawa	829.52
Left bank of the Ujikawa	2,937.34
Upper course of the Kizugawa	24,233.12
Lower course of the Kizugawa	5,000.00
Total	32,999.98

Remarks :—The right bank of the Kizugawa both in upper and lower courses is being reclaimed.

RAILWAY

The projected line has a length of 8.6 miles and is to connect with the harbor railway operated by the government. It is planned to extend the line into the business district north of the Shirinashi River.

Branching off from Imamiya station the Harbor Railway line crosses both the rivers, Kizu and Shirinashi, and running along the right bank of the latter leads to the reclaimed ground in front of Minami Fukuzaki-cho. Then, traversing Tenpozan Canal, it runs through the coasting trade zone and reaches the pier district. A greater part of the line is to be constructed by the Government.

DREDGING WORKS

The plan is to dredge the front space of the west end of pier at the south bank of No. 1 Dock to the depth of 33.5 shaku. Besides the fronts of every pier are to be dredged to the depth of 30.5 shaku.

RECLAMATION WORKS IN THE FRONT OF SAKURAJIMA-MACHI

Cutting of north breakwater already constructed—30 ken in length.

New construction of a breakwater—100 ken in length.

The area of moorings—about 22,400 tsubo

The total area of creek and canal—about 33,900 tsubo

The area of the space to be reclaimed—about 156,900 tsubo.

EXPENDITURES AND FUNDS FOR HARBOR CONSTRUCTION

The following is a table showing the expenditures and funds for the harbor construction up to the end of the fiscal year of 1923.

Total Expenditures	Yen
Harbor Construction Expenses	28,503,021
Quay Construction Exp.	6,375,112
Dredging and Reclamation Expenses	6,181,459
Exp. for Piers	3,954,965
Miscellaneous Working Expenses	791,365
Building Exp.	305,563
Land Purchasing Expenses	110,000
Exp. for Machinery and Tools	8,462,379
Sundry Expenses	2,316,671
Expenses for Landing Places	5,503
Incidental Working Expenses	4,272,620
Readjusting Expenses for Reclamation Works	1,354,181
Expenses for Piers	547,620
Expenses for Temporary Quays	368,302
Expenses for Excavation of Canals	641,784
Road Construction Expenses	135,876
Construction Exp. for Buildings, Sheds, etc. ..	935,995
Sundry Working Expenses	144,966
Reclamation Exp. for the Front of North Quay ..	23,893
Expenses for Machinery and Tools	120,000
Maintenance Expenses	2,316,888
Dredging Expenses	183,067
Surveying Expenses	27,037
Expenses for Piers	294,634
Expenses for Beacons	16,287
Expenses for Launches, Tugs, etc.	110,640
Expenses for Lighting Houses and Buoys	183,248
Expenses for Levee and Quay	76,472
Land Expenses	673,637
Sundry Working Expenses	2,782
Expenses for Bonded District	113,335
Expenses for Reconstruction Work	30,658
Expenses for Operation	589,960
Expenses for Construction Work	15,126
Office Expenses and Sundry Expenses	2,874,278
Expenses for Loan	35,568,958
Total	73,535,767

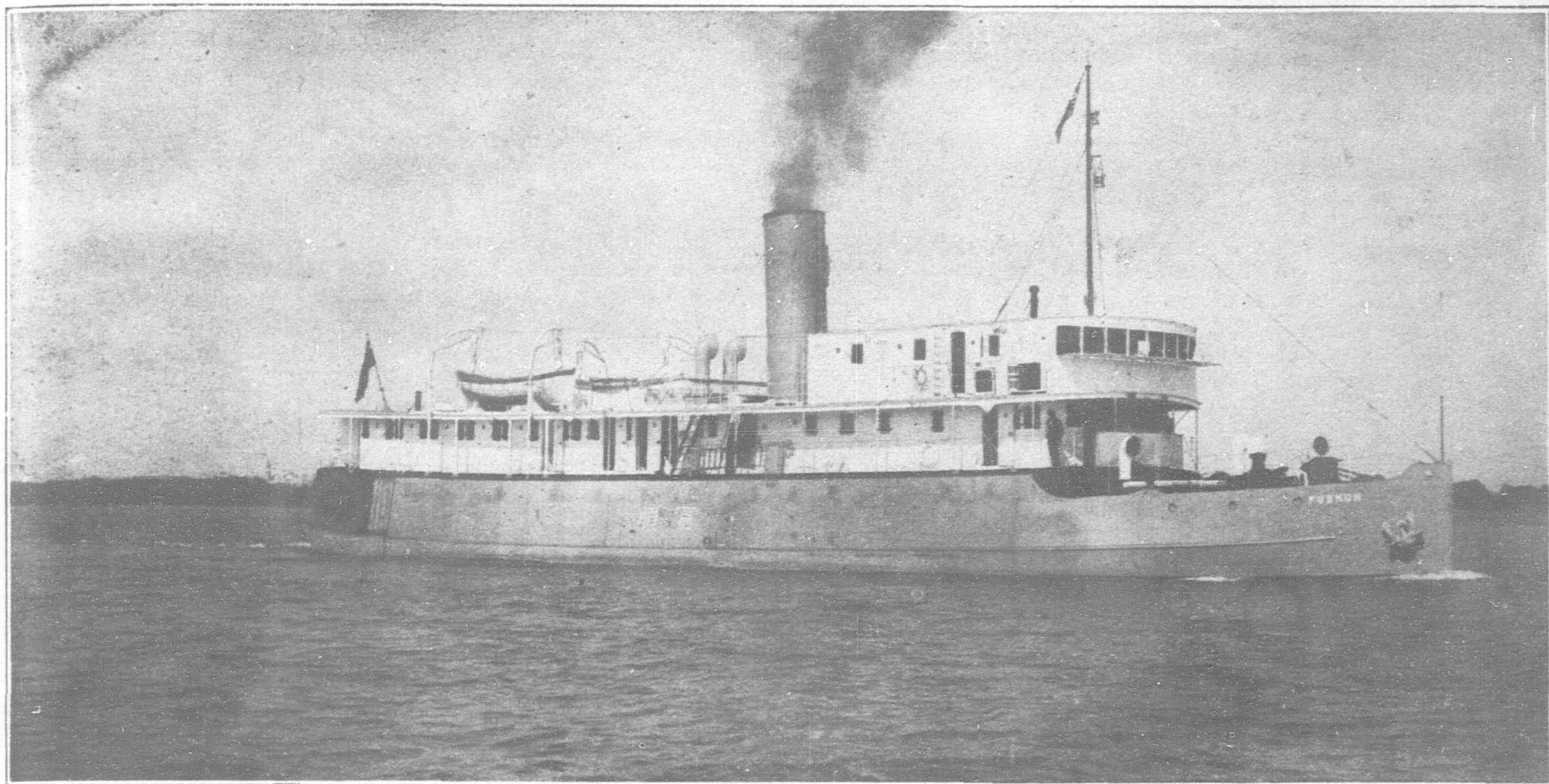
FUNDS

Loan	29,893,245
Municipal Taxes	17,113,053
State Subsidy	4,680,000
Price of Beach Disposed of	3,494,806
Price of Reclaimed Ground Disposed of	2,087,647
Rates for Water Supply	1,468,933
Tramway Revenue	4,014,256
Endowment Funds	308,164
Sinking Fund	411,524
Deposit	163,476
Rent for Land and Buildings	6,365,068
Fee for the use of Canal and Road	9,373
Revenue from Piers, Tugs, Water Supply, etc. ..	598,071
Contribution	401,965
Miscellaneous Income from Public Loan	1,283,036
Sale of Properties and other Sundry Income ..	1,789,550

Gross Total .. 74,082,184

The Popularity of Electric Lifts

Four electric passenger lifts manufactured by Messrs. Smith, Major and Stevens, Ltd., ordered by the Crown Agents for the Colonies, are destined for the new Fire Station Buildings at Hong-kong; there is an electric goods lift for the works of Messrs. Kodak Ltd., at Wealdstone and an electric platform hoist for service at Messrs. Millington and Sons the paper manufacturers. Two well-known hospitals are included for passenger and bed lifts, refectory and double hand power service lifts. A club building, bank premises, works and office buildings are also represented in this formidable list which not only proves the rapidly extending applications of lifts to all classes of building and for every description of service, but affords significant evidence of the extent of Smith, Major and Stevens' business.



The "Fushun"

The Yangtze River Boat, the "Fushun"

THE final British trials were successfully concluded at Southampton in September of the *Fushun*, shallow-draft twin-screw cargo and passenger boat, designed and built by John I. Thornycroft & Co., Ltd., to the order of Mr. Fung Kan-yu of Hongkong, for service on the upper Yangtze River of China. The writer, as British correspondent of the FAR EASTERN REVIEW, was among those who accepted the courteous invitation of Messrs. Thornycroft to attend the trials.

The problems involved in the construction of a vessel to trade successfully on this Chinese river are always interesting to naval architects. The stretch of river between Ichang and Chungking some 1,400 miles inland involves extraordinary difficulties. The fall of the river between these two places is no less than 476 feet in the distance of 400 miles, or an average gradient of over 14 inches per mile. Owing to this fall, and also because the river is confined in narrow gorges or ravines, there are some 35 rapids where the current at times exceeds 6 knots. At the most difficult of these rapids, the current may attain the extraordinary rate of 13 knots and the noise of them is distinctly heard at a distance of several miles. The rapids vary very greatly with the height of the river, some improving and others getting worse with a fall in level. This is because some rapids are caused by obstructions at the side of the river, and others by obstructions in the bed of the river. The former are improved by a low river and the latter made worse.

There is thus solid ground for the Chinese saying:—

"Yo tching wu yen; To yen wu tching."

meaning that when the Tching tan rapid is bad, the Ye tan is nothing; when the Tching tan is nothing, then it is time to fear the Ye tan.

In fact it is not too much to say that this stretch of river with its rapids, its shallows, its abrupt bends, its eddies, and submerged rocks would be labelled as "un-navigable" were it not such an essential artery, and the one outlet for the trade of an immense area, for the Yangtze is to China what the Mississippi and the Amazon and the Plate are to North and South America.

So important is the traffic on this great highway that before the war it was estimated that some 10,000 junks were trading between Ichang and Chungking. These junks are reckoned to do good business if they make two trips per annum—a sufficient index of the difficulties of the route! The upstream journey may take

three months while the down stream trip will be accomplished in from six to twelve days.

Moreover a relatively immense crew is required, the larger junks carrying over 100 men. Of these probably 80 will be landed at the rapids and these will "track" or haul the junk upstream by immense tow ropes. The remainder will be employed in fending off from rocks, and in working huge sweeps.

The first commercial vessel to ply unaided through the rapids was the steamer *Shu-Tung* built by Messrs. Thornycroft in 1909. The success of this vessel proved the possibility of regular services and opened the upper river to steam navigation.

The *Shu-Tung* was not, however, the first vessel to steam through the rapids. This honour belongs to H.M.S. *Woodcock* and H.M.S. *Woodlark*. These vessels were shallow draught gunboats, and were also built by Messrs. Thornycroft, but in the days when their works were at Chiswick.

Enough has been said to show the difficulty of design of satisfactory upper Yangtze vessels. High speed, shallow draught and extreme handiness are essential features, while definite limits of length are set by reason of the sharpness of some of the bends. In addition to the problems imposed on builders by the physical characteristics of the river, there is the equally important question of providing a sufficient deadweight carrying capacity to enable the vessel to trade profitably.

The principal dimensions of the *Fushun* are as follow:—

Length overall	.. ..	147' 8"
Breadth Moulded	.. ..	28' 0"
Depth Moulded	.. ..	8' 6"
Draft, mean F. W.	.. ..	6' 0"
Deadweight on 5' draft	.. ..	103 tons.
Deadweight on 6' draft	.. ..	201 "
Measurement of space about	.. ..	23,000 cubic feet.
Complement	.. ..	43 officers and crew, 136 passengers.

	Designed.	Actual.
Speed oil loaded	13.5 k.	13.9
Speed coal loaded	13.5 k.	13.9

The vessel is built of Siemens-Martin mild steel, and has a cut away fore foot of a type suitable for working in the rapids of the river. The stern protects the rudders which pass up through the counter, and are suspended on glands with ball bearings. A pole

mast is fitted to carry head light and for signalling purposes. The hull is divided into nine compartments by means of eight transverse bulkheads, and a trimming tank is placed forward of No. 1 hold. There are three decks, i.e. main deck, passenger deck, and sun deck.

The passenger deck is arranged for 24 first and 54 second class Chinese passengers, and the necessary cooking arrangements and lavatories are arranged on this deck. The vessel can also carry 54 third class passengers. The accommodation for the crew is under the fo'cle deck.

First class accommodation for four Europeans is arranged at the fore end of the sun deck, with a mess room, tastefully arranged with dining table, portable chairs, sideboard and mirror, etc. The chief comradore is accommodated in a room placed aft of the first class Chinese state rooms on the passenger deck and a stewards' room is on the opposite side. First class Chinese saloon is arranged in the forward deckhouse on the passenger deck, with five 4-berth and two 2-berth first class Chinese state rooms, aft of this are also arranged two-berth cabins alongside the engine casing for accommodating passengers or the ship's staff as may be required. Electric bells are fitted up in all the first class passengers' and officers' rooms and also in the saloons. A second

class saloon is allocated aft of the engine room casing, and eight second class 4-berth state rooms arranged in the aft deck house. The cabins for captain, chief-engineer, and a bathroom are arranged at the fore end of the sun deck. Holds are conveniently arranged for cargo. The vessel is supplied with two repeating telegraphs on the bridge. The steam steering gear is by Messrs. John Hastie & Co., Ltd. The steam windlass and warping capstan by Messrs. Clarke, Chapman & Co. are of exceptional power to meet the heavy duties of the passages of the rapids. A hand capstan is fitted aft on the main deck. The electric installation consists of a 4-k.w. 110 volt generator of open compound wound type driven by an independent enclosed forced lubrication steam engine $3\frac{1}{2}$ by 3 direct coupled.

The steering position on the sun deck is completely enclosed in a screen of bullet-proof plating against sniping from the banks.

The propelling machinery is arranged amidships and consists of two sets of high speed inverted direct acting triple expansion engines, constructed for a working pressure of 250-lbs. per sq. inch. The cylinders are $11\frac{3}{4}$ — $18\frac{3}{4}$ and 32" by 5" stroke. No auxiliaries are worked from the main engines.

There is one condenser common to both engines. The cranks, pins and webs are forged solid and bearing journal shrunk into bolts. The boilers are two in number of the Thornycroft latest water tube type arranged to burn coal or oil as desired and capable of supplying steam for the continuous development of 1,750 h.p. The oil fuel system is the Thornycroft, which has been very largely used in connection with water tube boilers of various types.

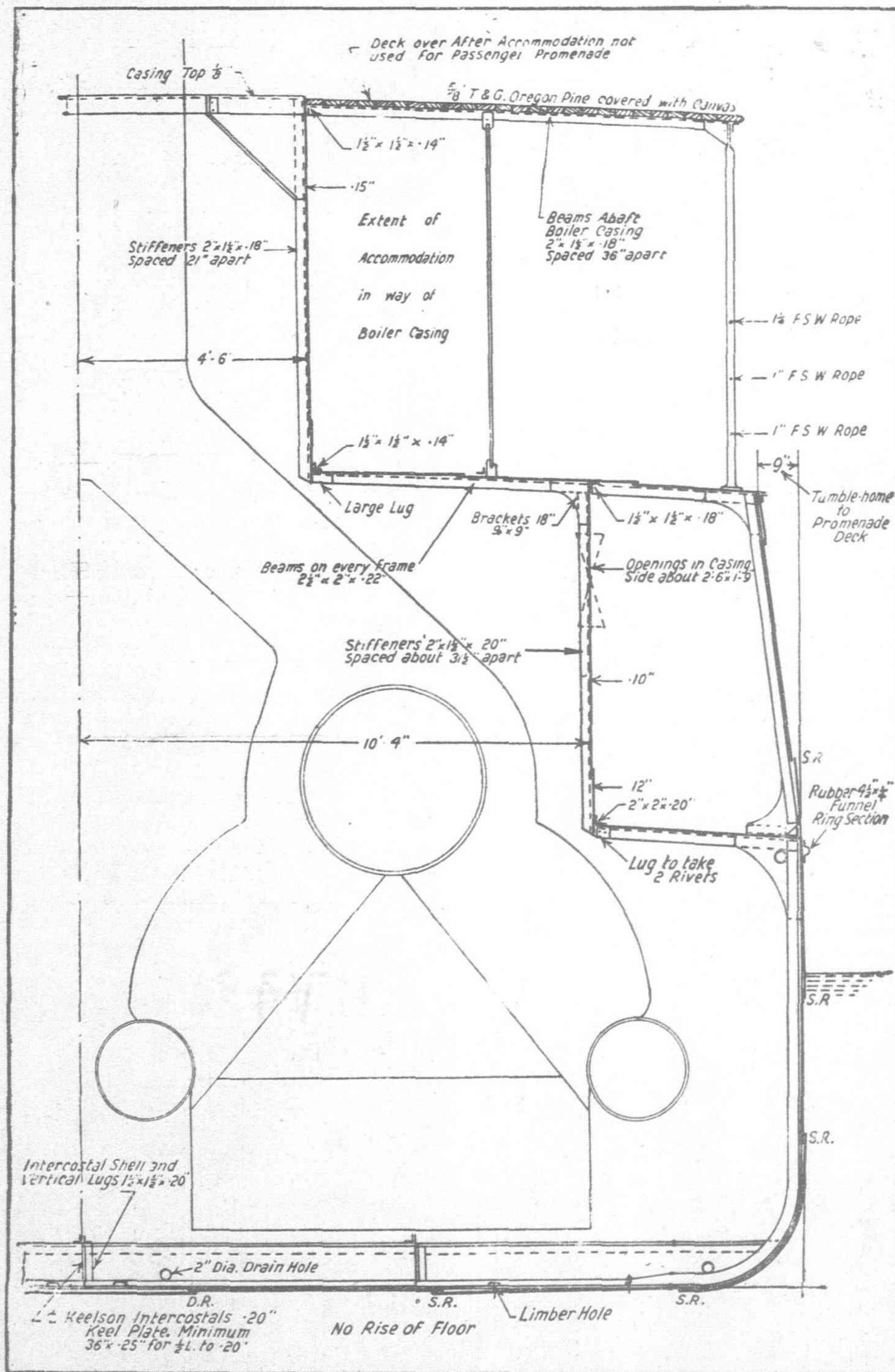
The boilers work under forced draught, closed stokehold.

The following auxiliaries are fitted:—

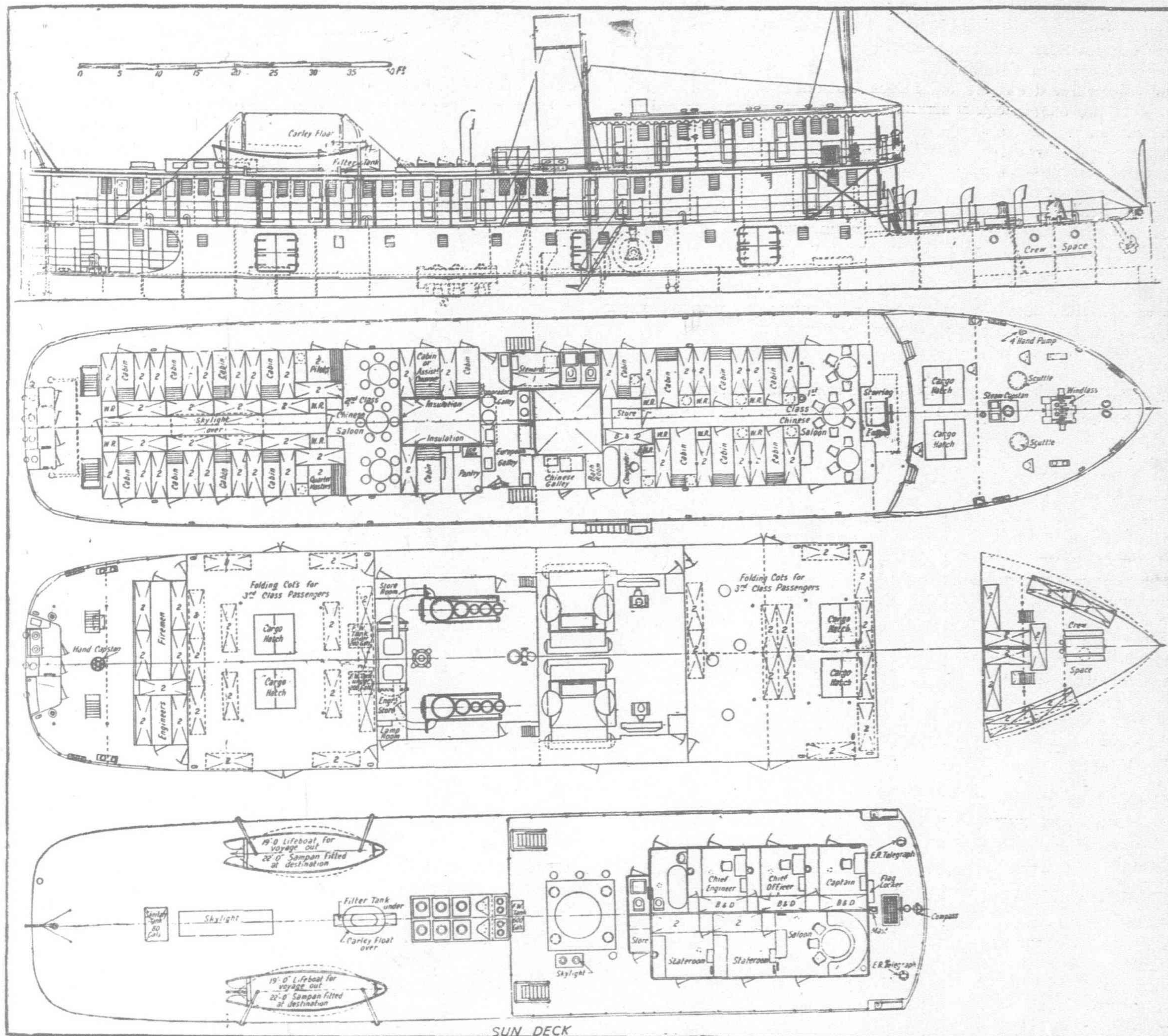
- One 11" circulating pump, enclosed forced lubrication engine.
- One Monotype air pump 19" by 12" by 15".
- Two Simplex feed pumps and float gear 6" by $8\frac{1}{2}$ " by 18".
- One Multiflow surface feed heater.
- One feed filter.
- One Duplex general service pump 6" by 4" by 6".
- One Sanitary pump $3\frac{1}{2}$ " by $5\frac{1}{4}$ " by 7".
- Two Fans and engines 60" dia. Engine $5\frac{3}{4}$ " by 4" of the enclosed forced lubrication type.
- Two oil fuel pump a $5\frac{1}{2}$ " by $5\frac{1}{4}$ " by 7"

The *Fushun* will very shortly be proceeding east under her own steam so as to reach Hongkong before the monsoon arrives, where she will undergo a final delivery trial before handing over to the owner, Mr. Fung Kan-yu, of Victoria, Hongkong, by whom the order for the vessel was placed with Messrs. Thornycroft's resident representative in Shanghai.

A very interesting feature of the trials of the *Fushun* is that she is the first shallow-draft river vessel to come under the new Lloyd's Register classification. The new rules mean that instead of a whole lot of different vessels being pushed into one class each ship is dealt with individually. As a result of this individual treatment, the *Fushun* has only a draft of six feet, and gives more cargo and passenger capacity than any other vessel of her type hitherto. She did over $16\frac{1}{2}$ knots on her trials, a splendid reserve of speed for the difficult Chinese river navigation she has to face, where she may have to encounter an adverse current of quite 13 knots. A significant comment on Chinese conditions is found in her bullet-proof screens set all around the steersman.



Midship Section of the "Fushun"



General Arrangement of the "Fushun"

Nobel Industries Ltd.

NOBEL Industries Limited have sent us a catalog of their products which contains an interesting list of the Associated Companies, as follows:

African Explosives and Industries Ltd., which controls
Cape Explosives Works, Ltd.

Amac Ltd.

Wm. Bennett, Sons & Co., Ltd.

Bickford, Smith & Co., Ltd.

British Electric Detonator Co., Ltd.

British Pluviusin Co., Ltd.

British Westfalite Ltd.

Curtis's & Harvey Ltd.

"E.C." Powder Co., Ltd.

Eley Brothers Ltd.

Elterwater Gunpowder Co., Ltd.

Excelsior Motor Radiator Co., Ltd.

Fredk. Crane Chemical Co., Ltd.

R. & T. Jack & Co., Ltd.

King's Norton Metal Co., Ltd.

Kynoch Ltd.

Lancashire Explosives Co., Ltd.

Lighting Trades, Ltd., with which are incorporated The
Ramie Company and The Volker Lighting Corpora-
tion.

Lightning Fasteners Ltd.

John Marston Ltd.

Necol Industrial Collodions Ltd.

New Pegamoid Ltd.

Nobel (Australasia) Ltd.

Nobel's Explosives Co., Ltd.

Paper Goods Manufacturing Co., Ltd.

Patent Electric Shot Firing Co., Ltd.

Portland Glass Co., Ltd.

Premier Electric Welding Co., Ltd.

Roburite and Ammonal Ltd.

Rotax (Motor Accessories) Ltd.

Sedgwick Gunpowder Co., Ltd.

Thermit Ltd.

W. H. Wakefield & Co., Ltd.

A. Walker & Co., Ltd.

The Head Office of the Company is Nobel House, Buckingham
Gate, London, S.W.1.

The London Electric Firm

THE London Electric Firm has been engaged in making all types of searchlights for many years, including Naval, Marine, Suez Canal (dual beam) Fire-fighting, Cinema and every other type, from the "Baby" size to 84-in. diameter as well as of the high efficiency type demanded by modern conditions.

Fig. 1 illustrates a projector of which this firm has recently built a number (somewhat similar) for a South American Navy. These machines represent the very last word in searchlight construction, and in point of efficiency represent the greatest advance eclipsing anything which has been done during the War, or since. Wide angle effects in these searchlights can be arranged to give angles of 16, 30 or 45 degrees, and the beam produced is fan shaped; or alternatively elliptical beams with angles varying from 11 to 45 degrees, the latter being used generally only in large projectors. A patented method of producing floodlight effects at short range, is produced by this concern whereby a wide angle—at least

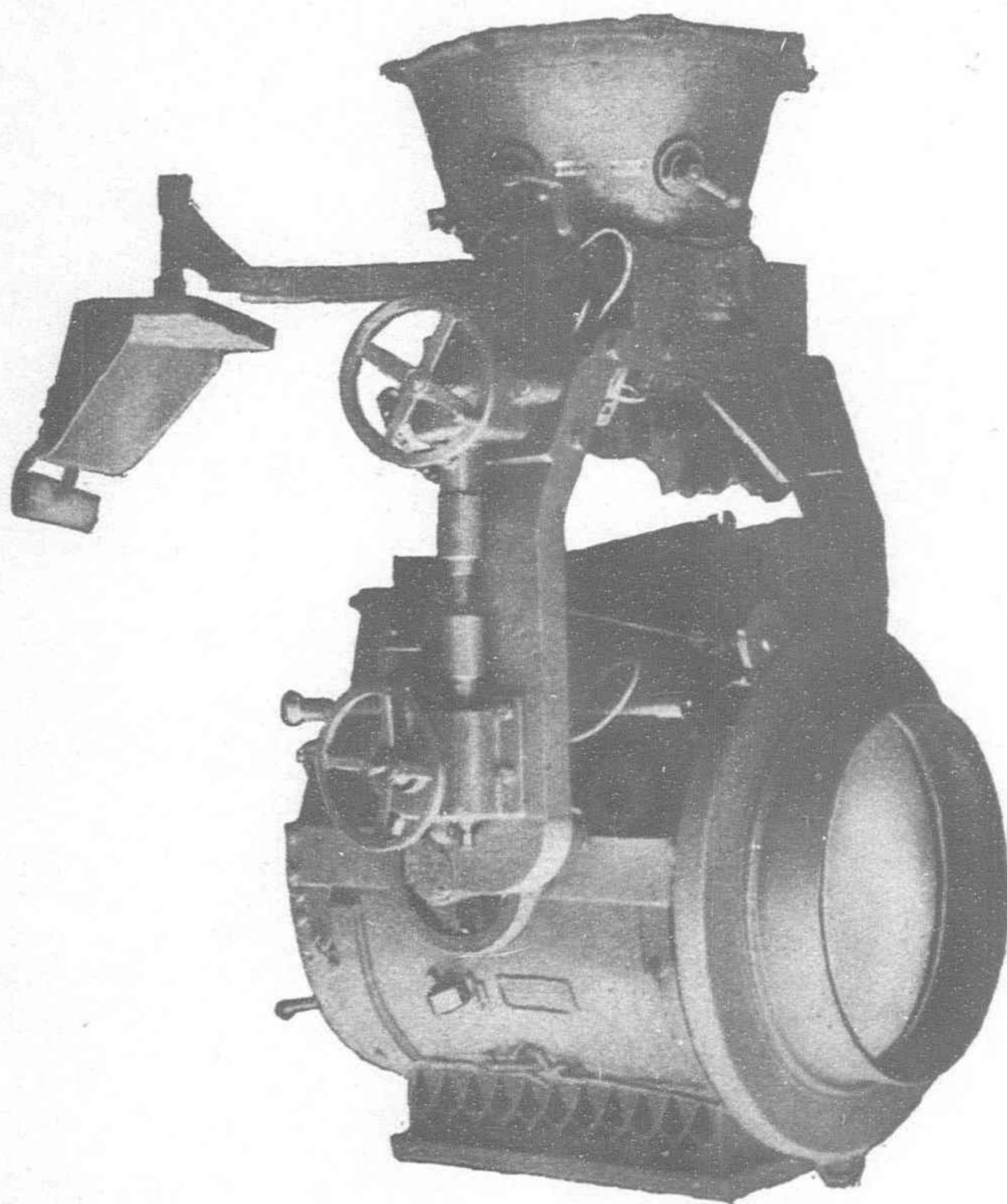


Fig. 1. The London Electric Firm's Projector

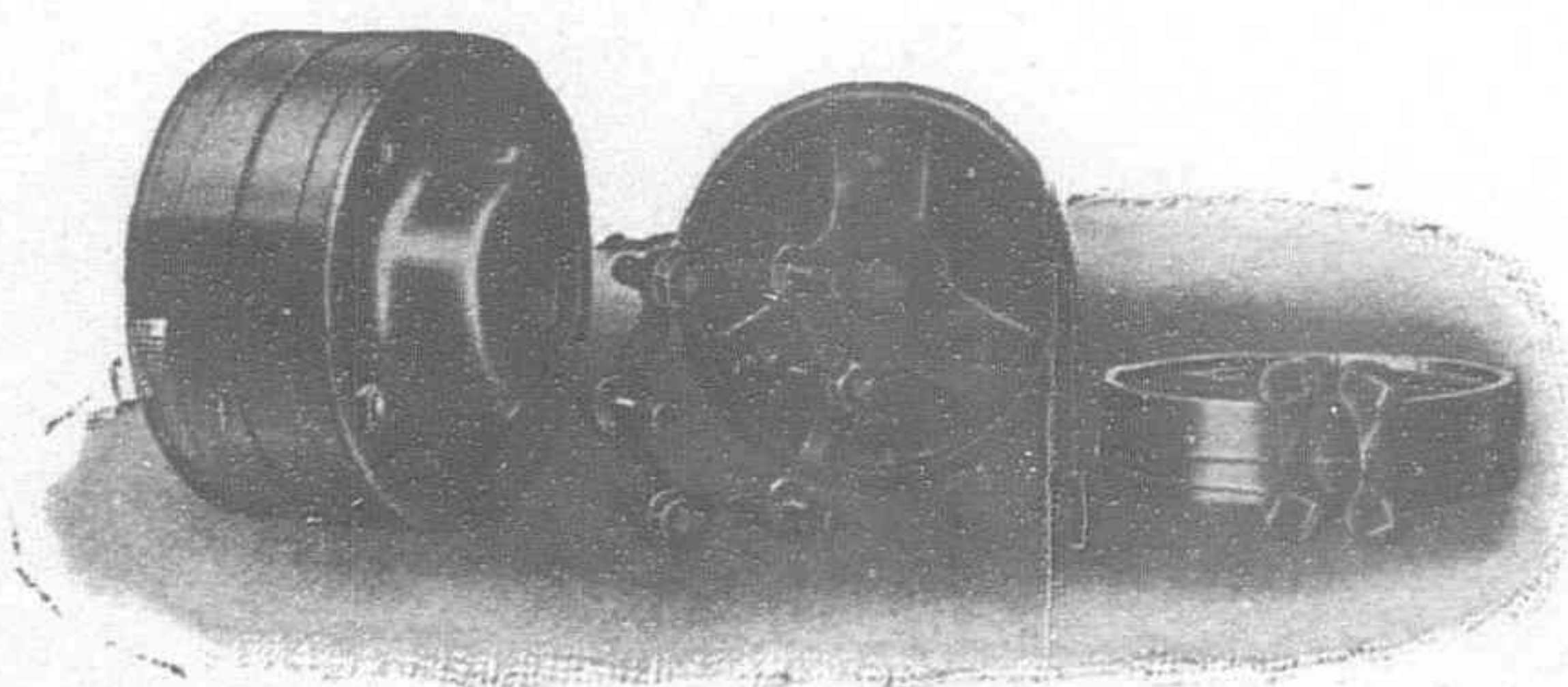


Fig. 4. A Flexible Coupling Produced by the London Electric Firm

up to 40 degrees, or probably more, can be obtained, the effect being practically shadowless and conical *i.e.* the illuminated field is circular. Other searchlights with special characteristics for various classes of work are produced, and a large variety of diverse patterns of machines are kept in stock and progress.

The London Electric Firm also has been making a lamp suspension and lowering gear for the last 21 years, and a classic instance is that of the City of London, as Fig. 2. The gear consists of a contact suspension device which automatically makes and breaks the circuit, and at the same time takes the weight of the lamp off the small winding rope and transfers it to the point of support, so that in swaying in the wind there is no risk of the wire rope becoming fractured; and the system, of course, obviates the use of cumbersome, expensive and risky tower ladders, etc. Besides its application to arc lamps, it is also useful for suspending large electroliers in buildings to enable them to be lowered for renewal of lamps and cleaning, etc.



Fig. 2. Central Suspension Lighting at Hove. Installed by the London Electric Firm

The firm manufactures winches (Fig. 3) of all kinds up to 10-cwts; and flexible couplings made entirely of metal (no perishable or combustible material being employed a point of high importance especially in aqueous situations). Fig. 4.

The Electric Heating Co. of George Street, Croydon, a branch works, manufacture all kinds of electric heating apparatus, as well as a clockwork operated fan.

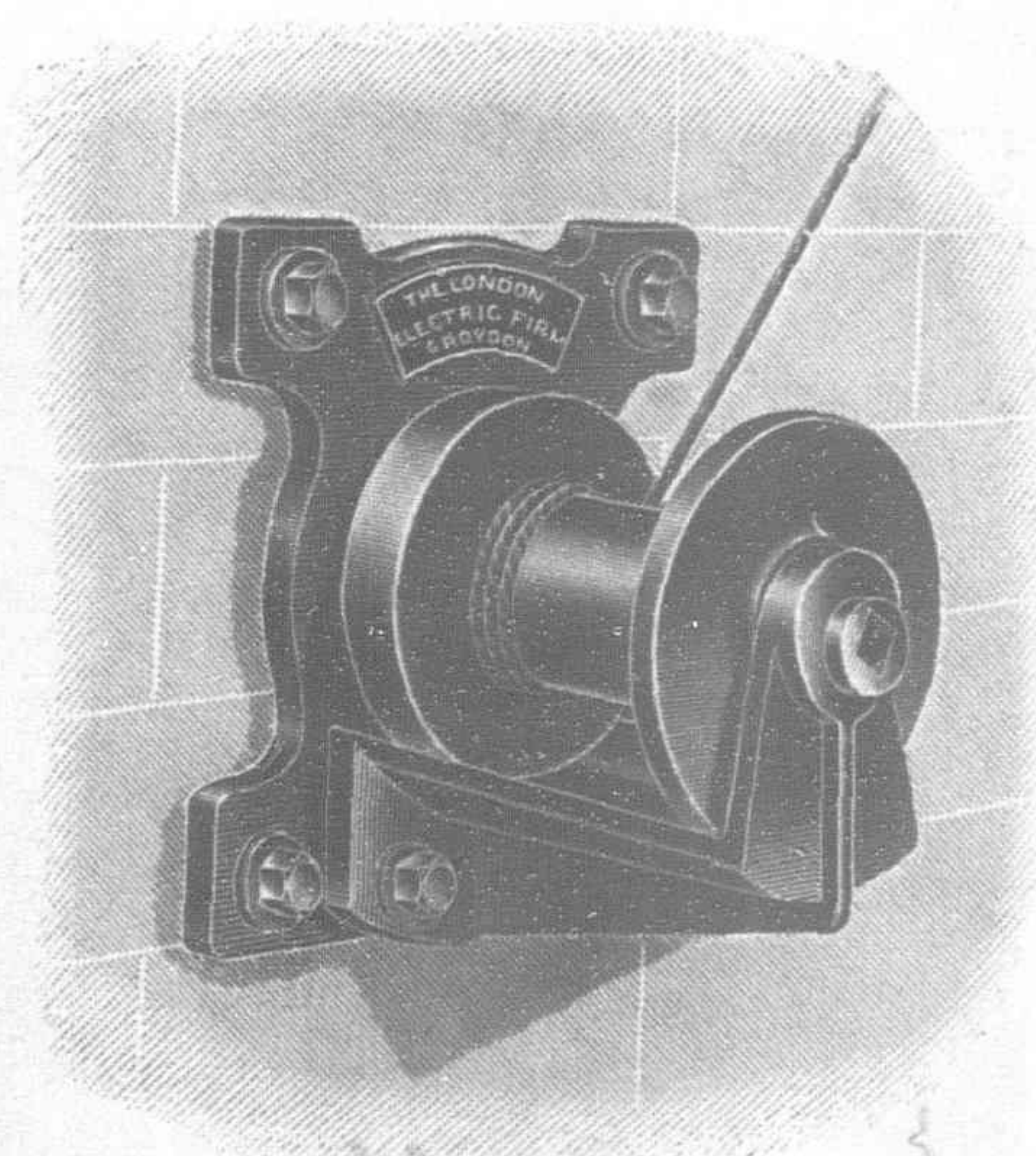


Fig. 3. Self-Sustaining Winches Produced by the London Electric Firm

Pivots in the Superpower System of Japan

By I. F. Baker

Managing Director, Westinghouse Electric Company of Japan.

A POWER transformer may be considered as the fulcrum of an electrical lever which enables a small current with a high voltage arm to produce a heavy current on a low voltage arm. The reverse operation occurs in the case of step up transformers at generating stations. Viewed in this way a transmission system is a system of levers balanced one against the other.

During the past five years a great development in electrical power has taken place in Japan which has introduced many pivot points where the power is transferred according to the needs of the system. Great strains occur on these transformer stations and they must be solidly built. They are subject not only to inroads of lightning, but to the strains set up by the inevitable surges that occur in long transmission lines. They are usually of outdoor construction and must, therefore, withstand the summer rains and winter snows. Earthquakes and typhoons serve as an occasional test of their stability.

Among these transformers in Japan are found a great many of the shell type construction; it being apparent to engineers that encasing the transformer coils in a shell of iron affords the best protection against the service shocks which must be withstood by the comparatively delicate windings.

The first company in Japan to adopt shell type transformers for 115,000 volts was the Inawashiro Hydro Electric Company, which now forms a part of the great Tokyo Electric Light Company system. In 1913 the Inawashiro Company purchased twelve 4,400 kv-a., 6,600-115,000 volts, transformers, for their No. 1 Generating Station near Lake Inawashiro, and the same number of step down transformers, 100,000-11,000 volts, 4,000 kv-a., for their Tabata Substation at Tokyo. For eight years these transformers were the largest both in capacity and voltage of any in Japan and served as an example of what should be expected in the way of performance. Since 1921 many more transformers have been installed in the Tokyo district among which the following are cited as of special interest:

The Kaya-tsuki Transformer station is located in the mountains of north-western Japan and includes the largest self cooled transformers in Japan. There are four of these transformers, each 7,000 kv-a., single phase, 50 cycle, connecting the 154,000-volt Joetsu transmission line with a 66,000-volt line fed by an initial installation of three 4,800 kv-a., 6,600-66,000 volts, transformers at

the Yuzawa Generating Station. There are heavy snows in this vicinity and the most severe service is experienced.

On the transmission line leading to Tokyo another bank of transformers is located at the Komatsu Substation which steps up power at 6,600 volts and 63,000 volts to supply the main transmission line at 154,000 volts. These transformers are consequently of the three winding construction. They are each 21,000 kv-a., on the 154,000-volt winding, 16,000 kv-a. on the 63,000-volt winding and 6,000 kv-a. on the 6,600-volt winding. They are oil insulated, water cooled and at the time of their installation were, from the standpoint of physical dimensions, the largest water cooled transformers, not only in Japan but in the whole world.

Among the transformers which feed power to the Komatsu bank are four 6,700 kv-a., 6,600-3,800 volts, star connected units at Kamikuya No. 2 Station and four 4,800 kv-a., 6,600-66,000 volts Delta connected transformers at the Komatsu Generating Station.

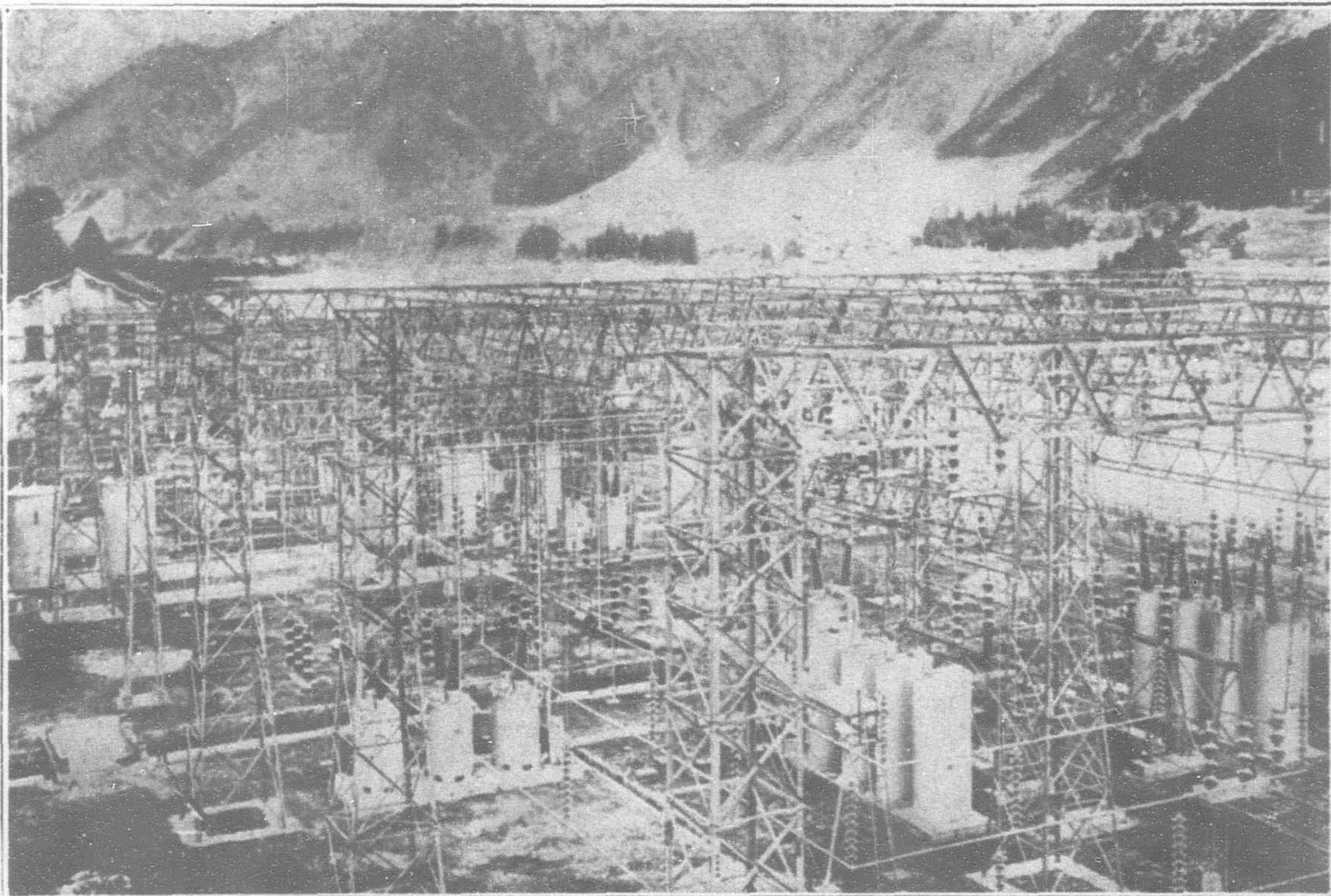
Recently an order was placed by the Tokyo Electric Light Company for additional transformer equipment so that the power from Lake Inawashiro can be brought to Tokyo at 154,000 volts. These transformers are of giant size, some of them being even larger than the Komatsu transformers.

Four 16,500 kv-a., water-cooled units will be installed at Generating Station No. 3 and four 10,000 kv-a., two winding transformers will be installed at Generating Station No. 4. The larger transformers will be of the three winding construction in order to take power from the old Inawashiro Generating Station Nos. 1 and 2, when it is desired to send that power to Tokyo over the 154,000-volt line rather than over the old 115,000-volt line.

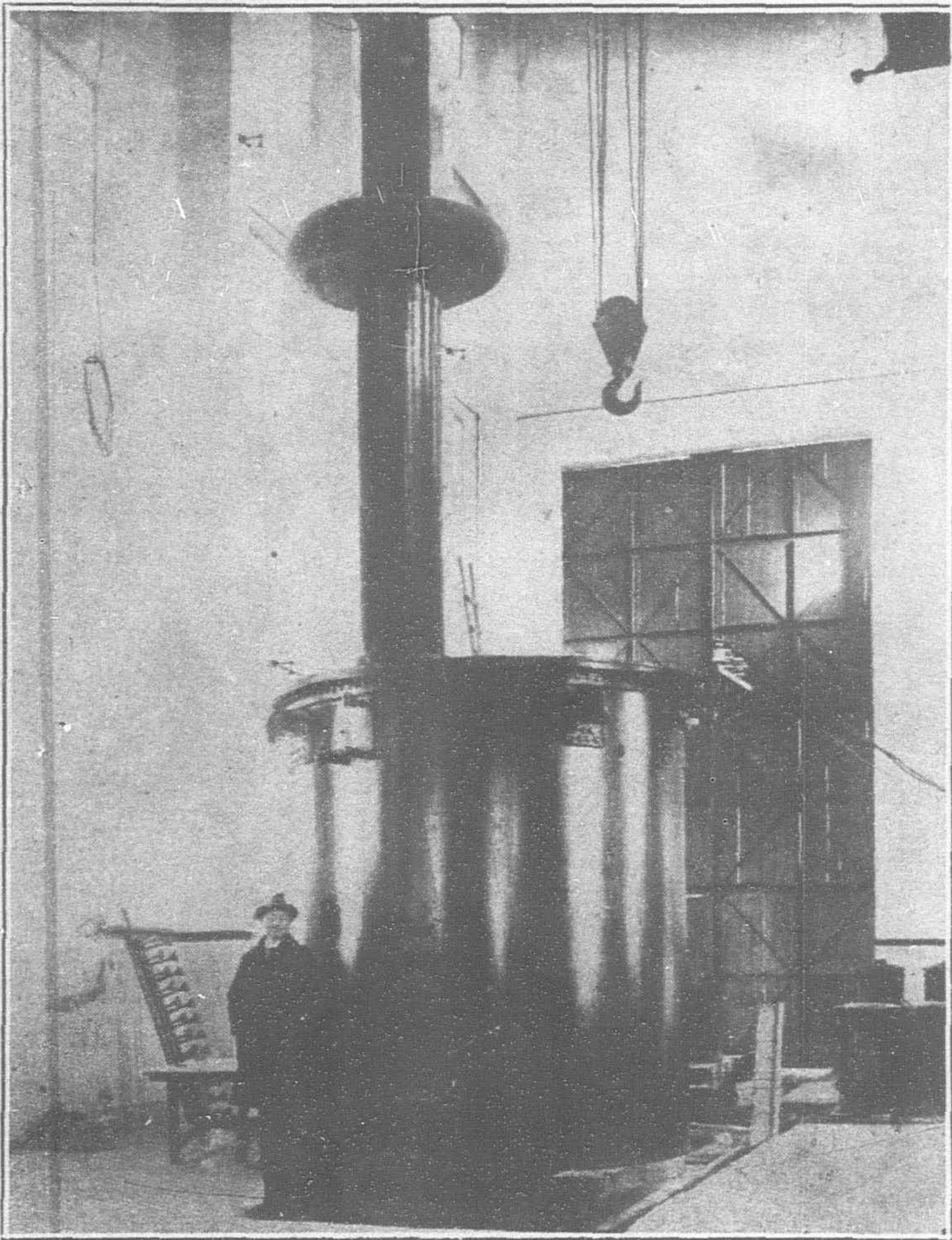
The power will be stepped down at Tokyo in two substations: Hanabata and Hatogaya. Each of these substations will contain three 25,000 kv-a., three winding water-cooled transformers, capable of delivering power either at 66,000-volts to the low tension belt line around Tokyo or at 11,000 volts to a 25,000 kv-a. synchronous condenser which will be installed in each substation.

All of the new Inawashiro transformers will be of the Westinghouse shell construction, type except the 10,000 kv-a., two winding units which will be of the core type construction.

It is an accepted fact that the shell type construction lends itself much better to three winding design than does core type construction. The regulation between the three windings can be readily equalized by interlacing the pancake coils; whereas the



This station, on the Kiso River of Japan, ties together, by means of two 28,200 kv-a. transformer banks, the 77 kv. distribution to Nagoya and the 154 kv. distribution to Osaka



A 50,000 volt testing transformer—Tokyo Electric Light Company

concentric cylindrical core type transformer does not permit this interlacing. An additional feature of these new transformers is that they will each be equipped with inertia attachments which will provide nitrogen gas in the tank. This is a new development of Westinghouse engineers and eliminates many troubles formerly inherent with power transformers. This device prevents the oxygen from getting into the tank where the transformer breathes, cutting down the fire hazard and removing the tendency to sludge in the transformer oil. The inert gas also serves as a cushion between the oil and the cover of the transformer should there be any internal troubles in the transformer.

The Tokyo Dento has also installed four 17,000 kv-a., water cooled transformers at its Hashimoto Substation for stepping down the 154,000-volt power from its Keihin line so that it can be transported to Tokyo over a 66,000-volt line to Senzoku Substation. These transformers have been in successful operation for several years. At the other end of the Keihin line extending to western Japan we find a bank of four 10,000 kv-a. step up transformers transferring power from the Daido system to the Tokyo system. The transfer of power from Daido to Tokyo being on the increase, an additional bank of transformers has been ordered and is now being installed.

The Daido transmission system extends from the 10,000 kv-a. transformers at Shiojiri down the Kiso river to a point where it turns off to Osaka. All along this line are found step up trans-

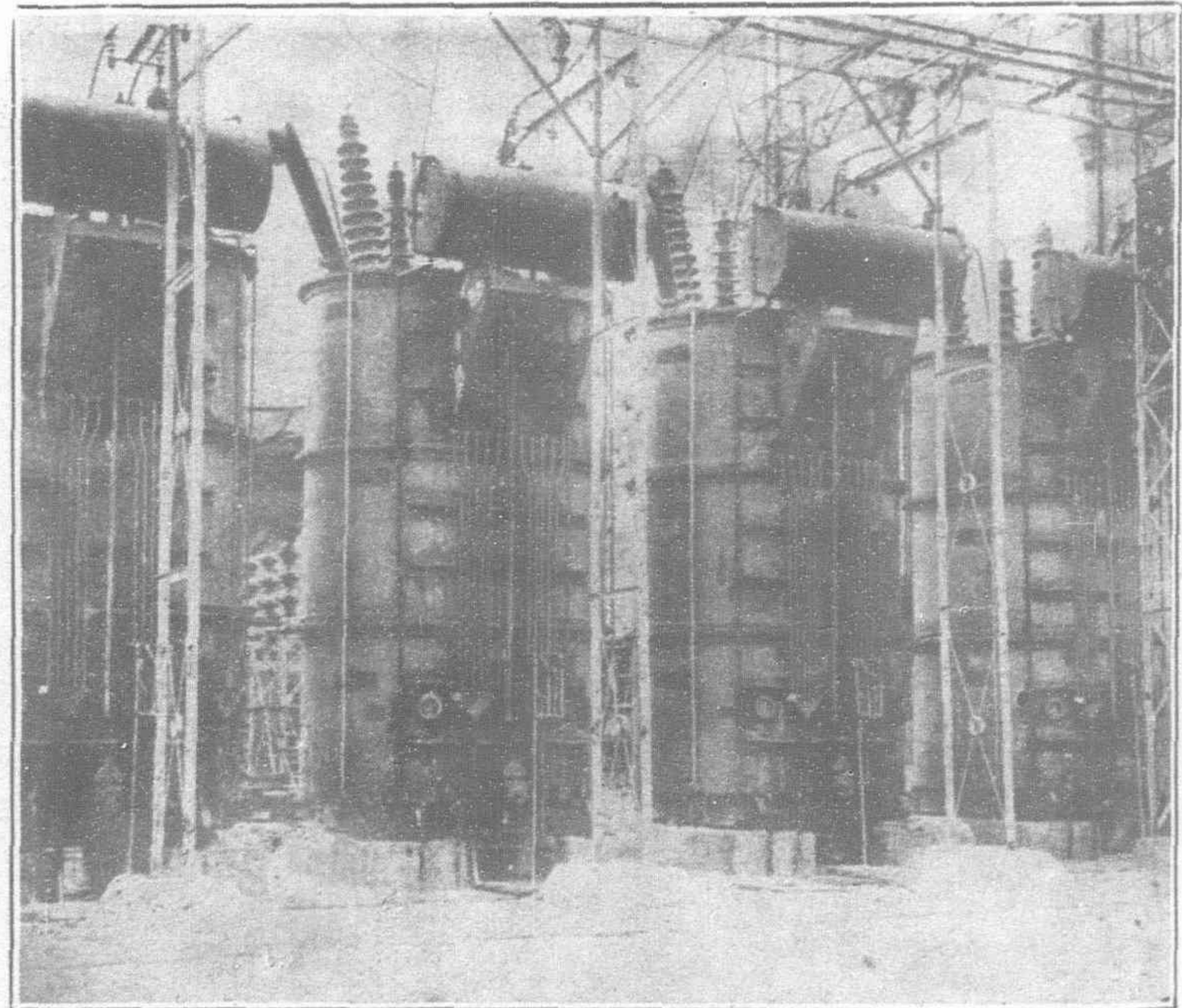
formers from the various power stations on the Kiso river. At Osaka there is an enormous substation, called Furukawabashi, which contains the largest concentration of power transformers in Japan. This station has eighteen 9,400 kv-a., water cooled, three winding transformers stepping down from the 154,000-volt line to 55,000 and 11,000-volt, and seven 5,000 kv-a., 55,000/11,000 units, involving a total kv-a. capacity of 204,200 kv-a. It also contains six 15,000 kv-a. synchronous condensers.

One of the interesting transformer stations in western Japan is that of the Etchu Denryoku, situated on the Joganji river. This station steps up 12,000 kv-a. power from 6,600 volts to 66,000 volts, and transmits it to the Sazazu Substation of Nippon Electric. At this point power is again stepped up to 154,000 volts and re-transmitted over the Nippon lines one hundred and ninety-four miles to the city of Osaka.

In the Tokyo district there are several large installations which are of special interest. In 1921 the Gumma Electric Power Co. installed a 115,000-volt system which required four 3,500 kv-a. water cooled transformers at the Kanai generating station and a similar installation at the Kawasaki Substation near Tokyo. This company has recently been incorporated with the Hayakawa Electric Power Company under the name of Tokyo Electric Power Company and the new group promises to be one of the largest power companies in Japan, because of the company's ability to develop new water power to supply the increasing demand in Tokyo.

The Imperial Government Railway has not yet developed power on a large scale, but has installed numerous transformers in its many substations near Tokyo which step down power suitable for the electrified zone. For rotary converters alone it has installed or purchased twenty-one self-cooled transformers 2,100 kv-a., three-phase, 11,000-volt, 50-cycle, and twelve 1,100 kv-a. transformers of the same characteristics. Further extensions are in progress.

The installations mentioned above exceed 1,500,000 kv-a. and although they do not include nearly all stations they do give a very good idea of the extent of power transformation in Japan.



Four 21,000 kv-a. O.I.W.C. transformers at the Komatsu Station of the Tokyo Electric Light Co.

Armstrong Whitworth Secure Valuable Concession in F.M.S.

The Federated Malay States Government has signed a concession under which rights are granted to Sir. W. G. Armstrong Whitworth & Co., Ltd. to develop an Hydro-Electric Power Scheme on the Perak River in the State of Perak.

The power so obtained will be applied principally in the development of the Kinta Valley and neighbouring tinfields situated in the

same State, and in cheapening the cost of production in that area.

The scheme will involve the purchase in Great Britain, through Sir. W. G. Armstrong, Whitworth & Co., Ltd. of a large quantity of machinery and electrical material, and has the support of the Trades Facilities Act Advisory Committee to the extent of £1,250,000 guaranteed.

Development of Superpower Stations in Japan

DURING the last eighteen months Japan has shown most remarkable development in Super Power Stations, using large units with high pressures and high superheat.

The list below which shows plants ordered in Japan within the above period will illustrate this position, and will, we think show that this progress is greater than any other country in the world, not even excepting America which is usually quoted when superpower stations are referred to.

The particulars of the plants below will show that all the latest accessories to efficiency are being installed including, water cooled walls, contraflow economisers, pulverised fuel, balanced draft compartment stokers, diamond soot blowers and even combinations of economisers and air heaters, all of which are required to exist when highly efficient power stations compete, and when efficiencies of 85% are commonly discussed.

The installing of boilers working at 500 lbs. per sq. inch., are now being considered by the Japanese engineer, and possibly such high pressure boilers will in the near future be installed, and quotations have been asked for and received for much higher working pressures, which shows that the Japanese engineer is in the forefront in connection with modern engineering practice, and his visits to all the large power stations of Europe and America have been well made use of when considering a power station design of his own.

C.T.M. Boilers Supplied and on Order for Japan

TOHO ELECTRIC POWER COMPANY, NAGOYA.—4 units of Babcock and Wilcox, C.T.M. Boilers each of 18,611 sq. ft. H.S., for a daily working pressure of 350 lbs. per sq. inch, construction, 60 wide, 6 × 8 high. 4 Babcock and Wilcox inter-deck superheaters each of 4,730 sq. ft. H.S., imparting superheat of 300°F to steam produced. 4 sets Babcock and Wilcox balanced draft compartment stokers triple 9 × 20 with induced and forced draft fans. Boilers fitted with Greens Economisers. The maximum continuous evaporation which could be obtained from such a boiler plant would be about 132,000 lbs per hour with average bituminous steaming coal.

TOHO ELECTRIC POWER COMPANY, NAJIMA.—2 units of Babcock and Wilcox C.T.M. boilers each of 13,467 sq. ft. H.S., for a daily working pressure of 275 lbs per sq. inch, construction, 56 wide, 10 × 2 high. 4 Babcock and Wilcox integral superheaters of 230°F. to the steam produced 2 sets of Babcock and Wilcox balanced draft Compartment stokers triple 9 × 20 with forced and induced draft fans. These boilers are fitted with Babcock and Wilcox super-imposed economisers having 5,570 sq. ft. H.S.

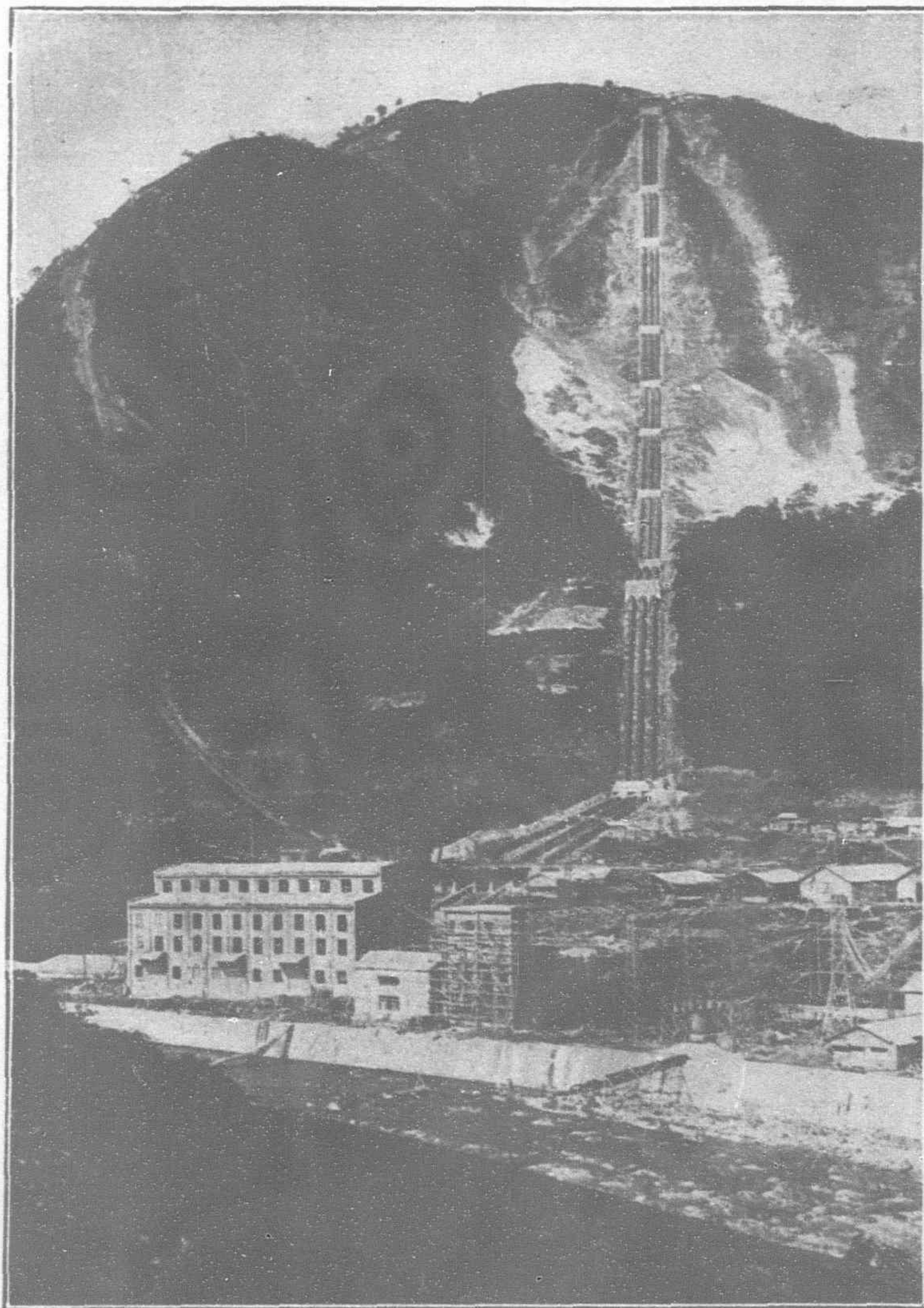
The maximum continuous evaporation which could be obtained from such a boiler plant would be about 120,000 lbs per hour with average bituminous steaming coal.

KYOTO MUNICIPALITY.—4 units of Babcock and Wilcox, C.T.M. boilers each of 6,156 sq. ft. H.S., for a daily working pressure of 250 lbs per sq. inch, construction, 30 wide, 8 × 2 high. 4 sets Babcock and Wilcox, integral superheaters imparting a superheat of 250° F. to the steam produced. 2 sets Babcock and Wilcox, boxed-in forced draft stokers, double 7-ft. × 8-ft. with forced draft fans. These boilers are fitted with Babcock and Wilcox super-imposed economisers each of 2,984 sq. ft. H.S. The maximum continuous evaporation which could be obtained from such a boiler plant would be about 55,000 lbs. per hour with average bituminous steaming coal.

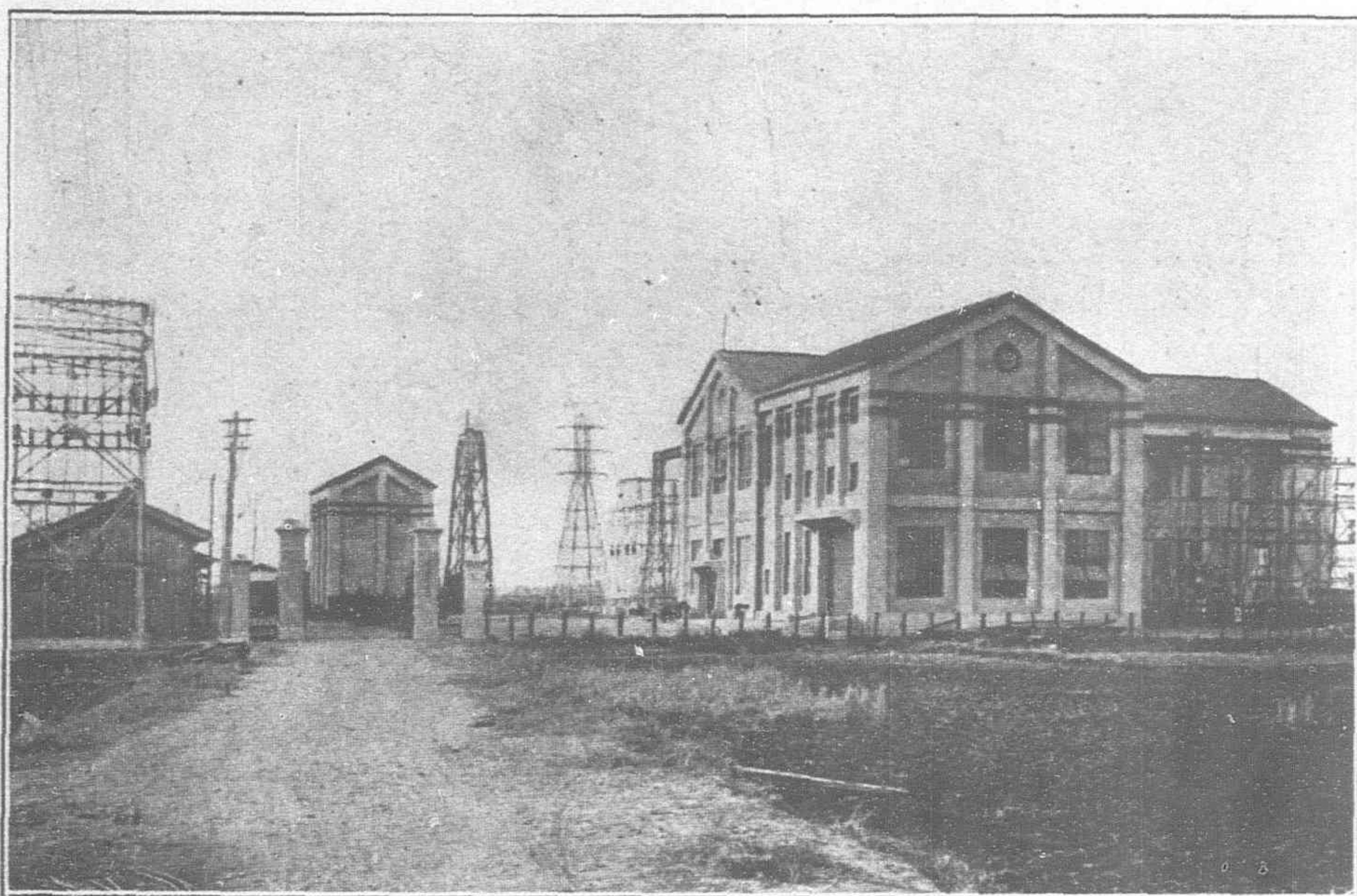
TOKYO ELECTRIC LIGHT COMPANY.—12 units of Babcock and Wilcox C.T.M. boilers, each of 10,821 sq. ft. H.S., for a daily working pressure of 250 lbs per sq. inch, construction, 45 wide, 10 × 2 high. 12 Babcock and Wilcox integral superheaters each of 2,778 sq. ft. H.S., imparting a superheat of 220° F. to the steam produced. 12 sets of Babcock and Wilcox balanced draft compartment type stokers triple 7-ft. × 16-ft. with induced and forced draft fans. These boilers are fitted with Babcock and Wilcox super-imposed economisers each having 4,476 sq. ft. H.S. The maximum continuous evaporation which could be obtained from such a boiler plant would be about 85,000 lbs per hour with average bituminous steaming coal.

THE NIPPON ELECTRIC POWER COMPANY.—8 Units of Babcock and Wilcox C.T.M. boilers, each having 10,821 sq. ft. H.S. For a daily working pressure of 275 lbs per sq. inch, construction, 45 wide, 10 × 3 high. 8 Babcock and Wilcox integral superheaters, each of 2,475 sq. ft. H.S., imparting superheat of 220° F. to the steam produced. 4 of these boilers are arranged for pulverised fuel, and four boilers for stokers. These boilers are fitted with Babcock and Wilcox super-imposed economisers each having 4,476 sq. ft. H.S.

NIPPON ELECTRIC POWER COMPANY, AMAGASAKI EXTENSION.—8 units of Babcock and Wilcox C.T.M. each of 13,467 sq. ft. H.S. For a daily working pressure of 275 lbs per sq. inch, construction, 56 wide, 10 × 2 high. 4 Babcock and Wilcox integral superheaters each of 3,123 sq. ft. H.S., imparting a superheat of 220° F. to the steam produced. 4 sets of Babcock and Wilcox balanced draft compartment type stokers triple 8-ft. × 18-ft. These boilers are fitted with Babcock and Wilcox super-imposed economisers of 5,570 sq. ft. H.S. The maximum continuous evaporation which could be obtained from such a boiler



No. 1, Power House of the Shin-yetsu Electric Power Co.



The Kasumori Substation, Nagoya

plant would be about 110,000 lbs per hour with average bituminous steaming coal.

THE HOKKAIDO TANK KISEN KAISHA.—3 units of Babcock and Wilcox, C.T.M. boilers of 6977 sq. ft. H.S., for a daily working pressure of 272 lbs per sq. inch, construction, 34 wide, 8 × 2 high. 3 Babcock and Wilcox, integral superheaters, each of 2,145 sq. ft. H. S., imparting a superheat of 230° F. to the steam produced. 3 sets of Babcock and Wilcox, balanced draft compartment stokers, and double 8-ft. × 18-ft. with induced and forced draft fans. These boilers are fitted with Babcock and Wilcox super-imposed 3,382 sq. ft. H.S. The maximum continuous evaporation which could be obtained from such a boiler plant would be about 61,000 lbs per hour with average bituminous steaming coal.

TOKYO ELECTRIC POWER COMPANY.—4 units of Babcock and Wilcox, C.T.M. boilers each of 18,611 sq. ft. H.S., for a daily working pressure of 375 lbs per sq. inch, construction, 60 wide, 6 × 8 high. 4 Babcock and Wilcox inter-deck superheaters each of 4,730 sq. ft. H.S., imparting superheat of 300° F. to steam produced. 4 sets Babcock and Wilcox balanced draft compartment stokers triple 9 × 20 with induced and forced draft fans. Boilers fitted with Babcock and Wilcox super-imposed economiser each 9,055 sq. ft. H.S. The maximum continuous evaporation which could be obtained from such a boiler plant would be about 132,000 lbs per hour with average bituminous steaming coal.

HIROSHIMA ELECTRIC COMPANY.—4 units of Babcock and Wilcox C.T.M. boilers each of 11,724 sq. ft. H.S., for a daily working pressure of 330 lbs per sq. inch, construction, 45 wide, 5 × 8 tubes high. 4 Babcock and Wilcox inter-deck superheaters each of 3,600 sq. ft. H.S., giving a final superheat of 715° F. to the steam produced. 4 sets of Babcock and Wilcox balanced draft compartment stokers, triple 6-ft. 6-in. × 20-ft. with induced and forced draft fans and chimney. These boilers are fitted with Babcock and Wilcox super-imposed economisers of 6,714 sq. ft. H.S. The maximum continuous evaporation which could be obtained from such a boiler plant would be 100,000 lbs per hour with average bituminous steaming coal.

THE TOKYO MUNICIPAL ELECTRIC BUREAU.—4 units of Babcock and Wilcox, C.T.M. boilers each of 6,155 sq. ft. H.S., for a daily working pressure of 275 lbs per sq. inch, construction, 30 wide, 8 × 2 high. 4 Babcock and Wilcox integral superheaters each of 2,400 sq. ft. H.S. giving a superheat of 250° F. to the steam produced. 4 sets of Babcock and Wilcox compartment type stoke of double 7-ft. × 18-ft. with induced and forced draft fans, complete with chimney and dust collectors. These boilers are fitted with Babcock and Wilcox super-imposed economisers each 4,476 sq. ft. H.S. The maximum continuous evaporation which could be obtained from such a boiler plant would be 55,000 lbs per hour with average bituminous steaming coal.

UJIGAWA HYDRO ELECTRIC.—4 units of Babcock and Wilcox C.T.M. boilers each of 15,319 sq. ft. H.S., for a daily working pressure of 375 lbs per sq. inch, construction 59 sections wide, 5 × 8 tubes high. 4 Babcock and Wilcox interdeck superheaters each 4,708 sq. ft. H.S., and 4 Babcock and Wilcox interdeck superheaters each 5,071 sq. ft. H.S. Imparting superheat of 250° F. to the steam produced. These boilers are fitted with water cooled furnace walls. The maximum continuous evaporation which could be obtained from such a boiler plant would be about 134,000 lbs per hour per boiler with average bituminous steaming coal.

NIPPON ELECTRIC POWER Co., TOKYO.—8 units of Babcock and Wilcox C.T.M. boilers each of 13,580 sq. ft. H.S., for a daily working pressure of 375 lbs per sq. inch, construction, 45 sections wide, 5 × 9 tubes high. 8 Babcock and Wilcox interdeck superheaters each 6,330 sq. ft. H.S., giving a final temperature of 740° F. to the steam produced. These boilers are fitted with Babcock and Wilcox contraflow economisers each 7,832 sq. ft. H.S. The boilers to use pulverised fuel.

New U.S.—Mediterranean Far Eastern Service

CONSIDERABLE excitement has been caused in shipping circles by the announcement of a new line to trade between New York, the Mediterranean and the Far Eastern ports. The company has been floated under the direction of several Tyneside shipowners and shipbuilders. The service is to consist of a dozen vessels. Six existing motorships of an average of slightly under 5,000 tons apiece form the nucleus of the service. To these are to be added six new motorships, somewhat larger in size, which are to be built on loan capital guaranteed under the Trade Facilities Act. The six ships are to be purchased under four small companies, total 27,831 gross tons, for which a price of £685,918 is to be paid, and the six new ships will total 51,488 tons for which £1,140,000 is to be paid. This will make the largest single effort in this country in motorship enterprise since Messrs. Furness, Withy and Company ordered five similar ships from Germany.

Even this order is completely eclipsed by a report which comes from Italy that the Navigazione Generale Italiana, in addition to building the record 33,000 ton motorship *Augustus*, is ordering two 11,000-ton motorships, as well as contemplating another large

liner of about 30,000 tons and three more 11,000-ton motorships. These are intended for the North and South American Australian and Far Eastern services. In addition to these ships for the N.G.I., there are about twenty cargo and passenger ships of between 4,000 and 6,000 tons building in Italy, all, of course under substantial Government subsidy. In Japan, the *Santos Maru*, now being completed, is the largest motor passenger ship built there, and is to be the first of three sister ships, intended by the Osaka Shosen Kaisha for their South American service.

With regard to the new vessels to be built for the Silver Line, Limited, the orders for the six cargo liners have been placed with Sunderland firms. Three of the orders have gone to Messrs. J. L. Thompson and Sons, Ltd., and three to Messrs. Sir James Laing and Sons, Ltd., The engines will be supplied by Messrs. W. Doxford and Sons, Ltd., and the auxiliary equipment by the Sunderland Forge and Engineering Company, Ltd. Eighty per cent. of the steel work will be supplied by Messrs. Bolckow, Vaughan and Co., Ltd., of Middlesbrough. Each vessel is to have a deadweight carrying capacity of 9,000 tons.

Ice-Making in Japan

THE Ice-making Industry in Japan suffered considerable damages from the earthquake of September 1, 1923, which visited Tokyo and its environs. Seven plants out of 12 in Tokyo, and 4 out of 5 in the neighboring districts of the Nitto Ice Manufacturing Company, the largest ice manufacturing company in Japan, also suffered severely from the quake. As a result, these eleven factories were forced to suspend their daily production of 654 tons, which was 80 per cent. of the total production in Tokyo. Meanwhile serious damage to the four plants of the Ryumon Ice Manufacturing Company, three plants of the Teikoku Cold Storage, and to the various factories belonging to the Koto, the Taisho, the Tokyo and the Nippon, the rivals of the Nitto Ice Manufacturing Company, were also reported.

Damage of the Earthquake

(TOKYO)

Nitto Ice Manufacturing Co.	{ 7 plants city 4 plants suburb)	654 tons
Tiekoku Cold Storage Co.	3 plants city	125 tons
Ryumon Cold Storage Co.	4 plants city	80 tons
Nippon Ice Manufacturing Co.	4 plants city	150 tons
Taisho Ice Manufacturing Co.		
Koto Ice Manufacturing Co.		
Tokyo Ice Manufacturing Co.		

(YOKOHAMA)

Toshin Cold Storage & Ice Manufacturing Co.	3 plants	115 tons
Teikoku Cold Storage Co.		
Japan Ice Manufacturing & Cold Storage Co.		

(SHIZUOKA)

Dzuto Ice Manufacturing Co.	1 plant	30 tons
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In Yokohama the total damage done to the Toshin Cold Storage and Ice Manufacturing Company, the Japan Ice Manufacturing Company, the Teikoku Cold Storage Company, etc. amounted to some 150 tons. However, by the beginning of the 1924 ice-requiring season the normal efficiency and working condition of all these factories had been re-stored.

This report shows that more than 60 per cent. of the total damage sustained was borne by the Nitto Ice Mfg. Co., which was only one-seventh of the total annual production of 3,950 tons manufactured by the Nitto Ice Mfg. Co. in 1923. Furthermore, the damages sustained amounted to only 4 per cent. of the company's actual assets, that is, about 8.5 per cent. of the paid-up capital, thus making the

burden lighter upon the Nitto Ice Mfg. Co. than on other companies which suffered also from the quake. Consequently the recovery of the Nitto Ice Manufacturing Company was much quicker in comparison with the rival companies.

That the public confidence in the Nitto Ice Manufacturing Company is 100 per cent. was clearly demonstrated when the Nitto Ice Manufacturing Company was the first of many firms to receive a loan of three million Yen from the Industry-Quake-Relief-Funds offered by the Government through the Industrial Bank of Japan. All the plants of the Nitto Ice Manufacturing Company which were damaged by the quake have now been reconstructed and are in perfect working order, having been equipped with the latest and most up-to-date machinery. The efficiency of the factories to-day is far superior to what it was before the quake.

Forty years have now passed since Japan first commenced to manufacture artificial ice. But it was not until the great world war and the years which have followed and brought such unexpected prosperity, that the ice-making industry has come to be recognized as one of the leading industries in Japan.

Ten years ago there were about forty companies manufacturing artificial ice, with a daily production of 2,000 tons. At that time the annual demand for ice was not more than 400,000 tons. However, with a steadily increasing supply and demand, averaging 20 to 25 per cent. a year, the total production, five years ago, reached a level of 4,000 tons a day, with an annual demand exceeding 800,000 tons. To-day the combined daily output of all the ice-making companies is in the neighborhood of 9,000 tons, the yearly demand being in excess of 2,000,000 tons.

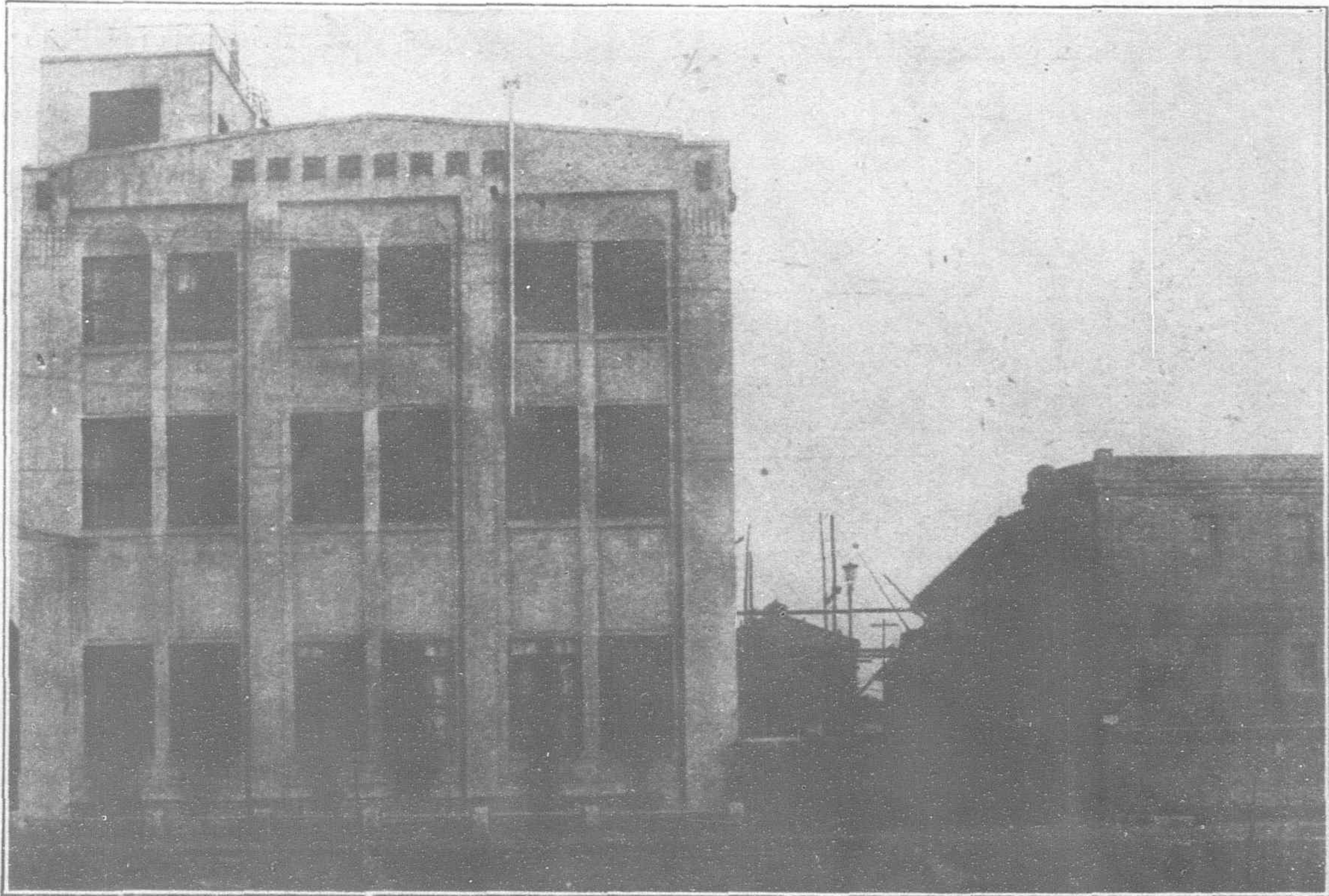
Of this combined daily output of 9,000 tons, the Nitto Ice Manufacturing Company is able to produce 5,000 tons a day, with a total annual production of 1,200,000 tons.

By the summer season of 1925 it is expected that the combined daily ice-making capacity will reach 10,000 tons. At this rate the annual production would be 2,500,000 tons, 80 per cent. of which would be sold on the market. It is figured 20 per cent. is lost in the process of manufacturing and in transportation.

What is the history of the Nitto Ice Manufacturing Company is that of the Ice-Making Industry in Japan. The following is a brief outline of the remarkable development of the Nitto Ice Manufacturing Company since its foundation.

In June, 1919, the two largest ice-manufacturing companies in Japan, the Nippon Ice Manufacturing Company and the Toyo Ice Mfg. Co., were amalgamated into one large company, the present Nitto Ice Manufacturing Company.

The Nippon Ice Manufacturing Company, one of the amalga-



The Head Office in Tokyo

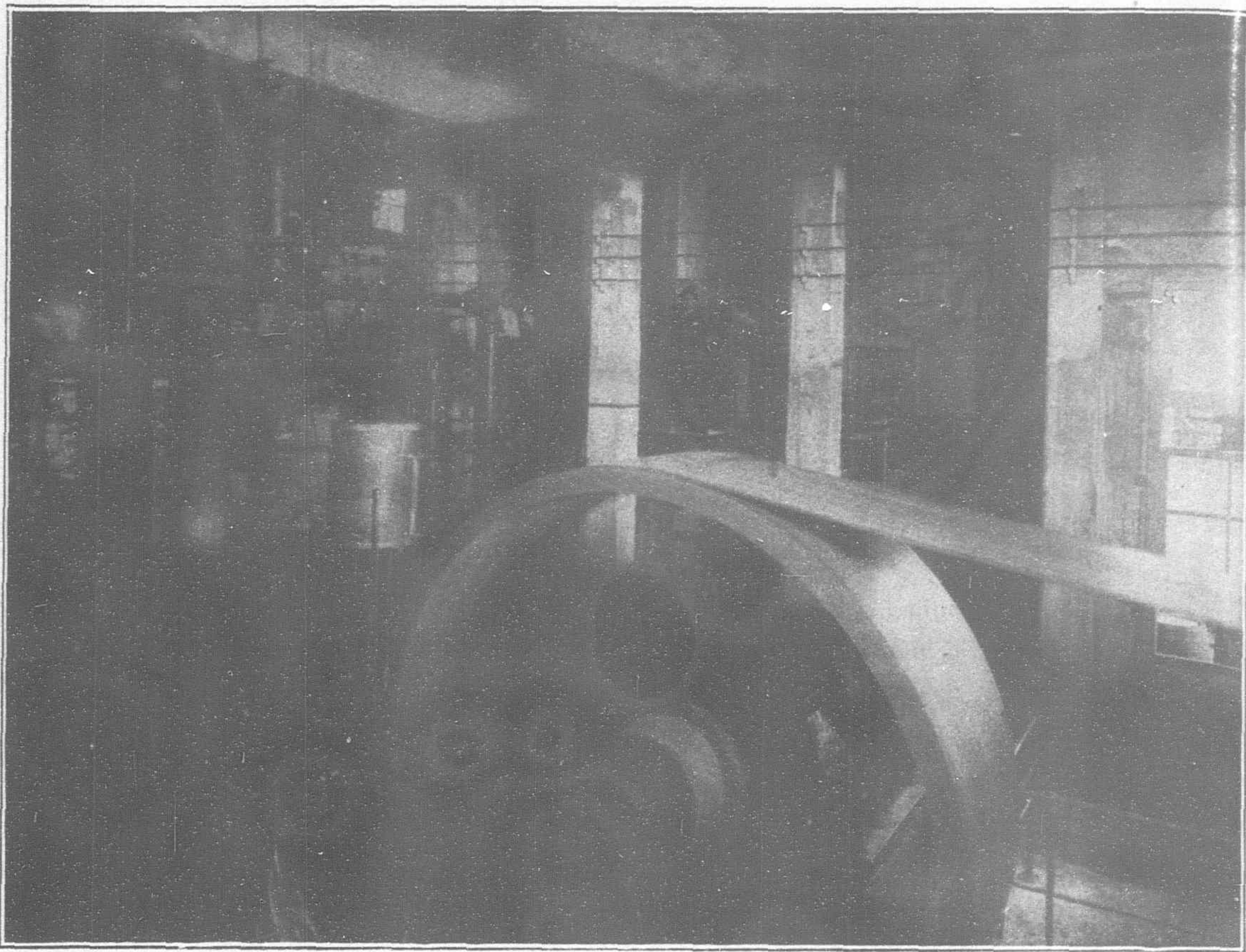
mated companies, was organized in 1907 as the result of the combination of the Machine Ice Manufacturing Company and the Tokyo Ice Manufacturing Company, which were established in 1887.

The Machine Ice Mfg. Co. when first organized had a capital of 252,000 Yen which was subsequently increased to 1,050,000 Yen, when the company was merged into the Nippon Ice Manufacturing Company, as the result of the amalgamation with the Tokyo Ice Manufacturing Company. The capital was again increased to 9,200,000 Yen when the company assumed the name of the Nitto Ice Manufacturing Company upon amalgamation with the Toyo Ice Manufacturing Company. At the end of February, 1925, the capital of the Nitto Ice Manufacturing Company was 18,822,500 Yen, but at present the capital of that company has amounted to 30,000,000 Yen. The paid-up capital will be increased to 21,766,000 Yen in May of this year which is expected to be enough to cover the cost of perfecting the refrigeration equipment and for the redemption of the quake-relief loan, previously referred to.

The increase of the capital since that time is due to a further consolidation of the firm in the amalgamation of thirteen more companies.

Of the 280 ice manufacturing companies now in existence in Japan, the Nitto Ice Mfg. Co. has investments in thirty companies, whose management is under its entire control.

Of the rival companies, the Ryumon Ice Company with 16 factories manufacturing 540 tons daily, the Teikoku Cold Storage



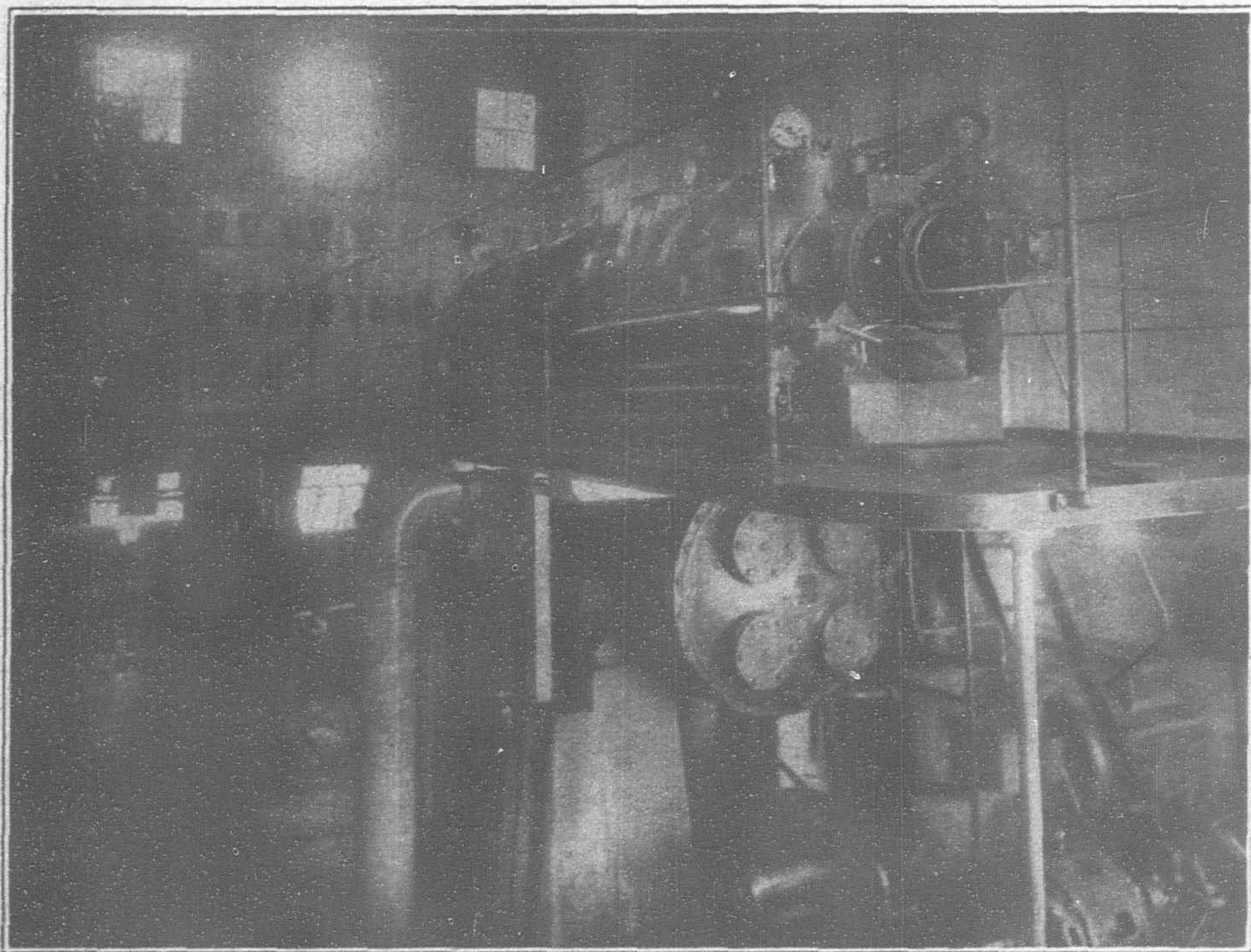
Compressor-Steam Turbine Room in the Background

Company with 7 factories manufacturing 278 tons daily, the Nippon Cold Storage Company with 2 factories manufacturing 175 tons, and the Kuzubara Cold Storage Company with 5 factories producing 137 tons daily, are the greatest competitors, although the combined output of the four companies scarcely reaches 1,130 tons a day, which is only 12 per cent. of the total ice-production in the country.

There are several other rival companies but they are on a much smaller scale, their output averaging less than 16 tons daily.

List of Subsidiary Plants of Nitto Ice Manufacturing Co.

Name	Capital	Number of Plants	Capacity
Ibaraki Ice Mfg. Co. ...	Y.687,050	4	45 tons
Nankai Ice Mfg. Co. ...	150,000	1	14 "
Taira Ice Mfg. Co. ...	500,000	3	35 "
Tago Ice Mfg. Co. ...	120,000	1	15 "
Tanabe Ice Mfg. Co. ...	150,000	1	12 "
Karatsu Ice Mfg. Co. ...	150,000	1	10 "
Nippon Ice Mfg. Co. ...	500,000	1	45 "
Tadotsu Ice Mfg. Co. ...	300,000	1	10 "
Sayeki Ice Mfg. Co. ...	100,000	1	5 "
Shiogama-ko Ice Mfg. Co.	500,000	3	65 "
Kagoshima Ice Mfg. Co....	1,000,000	2	35 "
Ugo Ice Mfg. Co. ...	500,000	1	10 "
Makurasaki Ice Mfg. Co.	200,000	1	10 "
Wakasa Ice Mfg. Co. ...	100,000	1	7 "
Zuto Ice Mfg. Co. ...	380,000	1	30 "
Akashi Ice Mfg. Co. ...	200,000	1	20 "
Kansai Ice Mfg. Co. ...	575,000	2	34 "
Owashi Ice Mfg. Co. ...	100,000	1	5 "
Yamagawa Ice Mfg. Co....	500,000	1	10 "
Tsuchiura Ice Mfg. Co. ...	300,000	1	15 "
Miya Ice Mfg. Co. ...	80,000	1	7 "
Susaki Ice Mfg. Co. ...	150,000	1	10 "
Meiji Cold Storage Co. ...	500,000	1	20 "
Toshin Cold Storage and Ice Mfg. Co. ...	1,000,000	1	40 "



Steam Generator and Switchboard

Name	Capital	Number of Plants	Capacity
Nitcho Ice Mfg. & Cold Storage Co.	500,000	1	30 „
Nishinomiya Ice Mfg. & Cold Storage Co.	100,000	1	10 „
Sawara Ice Mfg. & Cold Storage Co	100,000	1	10 „
Izu Ice Mfg. & Cold Storage Co	250,000	1	10 „
Azabu Cold Storage & Ice Mfg. Co.	500,000	1	15 „
Kusakabe Ice Mfg. & Cold Storage Co.	100,000	1	10 „
Total	Y.10,292,050	39	594 tons

The market of this country is divided into 8 sections, under the control of the main office and seven branch offices. The Nitto Ice Mfg. Co. has 118 factories under its direct management, with a combined daily ice-making capacity of 4,757 tons, two tons freezing efficiency being counted as one ton production. The present producing efficiency classified according to the various districts in the country with that of seven years ago reads as follows :

Capacity of Plants in each District

	1926	1919
Tokyo Head office	1,009 tons	510 tons
Shidzuoka Branch office ...	334 „	115 „
Nagoya „ „ ...	391 „	127 „
Osaka „ „ ...	911 „	325 „
Shimonoseki „ „ ...	1,156 „	503 „
Hakata „ „ ...	308 „	133 „
Nagasaki „ „ ...	373 „	108 „
Taiwan (Formosa) „ ...	275 „	132 „
Total	4,757 tons	2,013 tons

Capacity of Subsidiary Plants

30	companies
39	plants
594	tons

Total capacity of Nitto Ice Mfg. Co. including subsidiary plants 5,351 tons.

Some Far Eastern Contracts

THE year just closed has probably been the worst on record as regards the number and values of Far Eastern contracts placed in England. Everything appears to have conspired to being about this melancholy state of affairs. Prominent among these were financial troubles in Japan, political disturbances in China, unsettled state of the Continental currencies, enabling all European nations to undercut British prices. The better conditions which now generally prevail, assisted so far as Great Britain is concerned to a considerable extent by the boom in rubber, strike a note of hope for the future, and it is a good augury that for the past two or three months there has been an upward tendency in all calsses of business. Unemployment is decreasing week by week, and in every trade, coal alone excepted, business, if not booming, is showing very distinct signs of improvement.

Some few contracts for various Far Eastern Powers have been announced, and with the turn of the year it is stated that quite a number of new and important works will be open for competition. The fact that the Continental countries are endeavouring to stabilize their currencies has improved the outlook since their prices have been sharply increased and now, for the first time since the Armistice, Great Britain is enabled to quote prices for many engineering jobs that defy competition. Possible labour disturbances are the only fear, but these we have always with us, although at the moment matters from this quarter are far more quiescent than for long past. The stage is set for a great recovery and orders would appear to be likely to come forward in fair quantity.

Announcement has just been made that the Shanghai Municipality Electricity Department, has contracted with Messrs. Howden Ljungstrom Preheaters (Land), Ltd., for four large air preheaters for the Riverside Power Station to work in conjunction with two Babcock and Wilcox boilers.

To Messrs. Henry Hope and Sons, Ltd., a considerable contract for metal windows for the new Custom House at Shanghai, has been awarded.

The Metropolitan-Vickers Electrical Company, Ltd., of Manchester have received several good orders recently for large turbo alternator sets, and are now building these for Japan, Russia, Persia, the Argentine and India. A new set being constructed for the Nankai Electric Railways of Japan, will have a capacity of 12,500 kilowatts at 60 cycles, 3,600 revolutions per minute, and will be the largest British unit yet constructed to run at this speed.

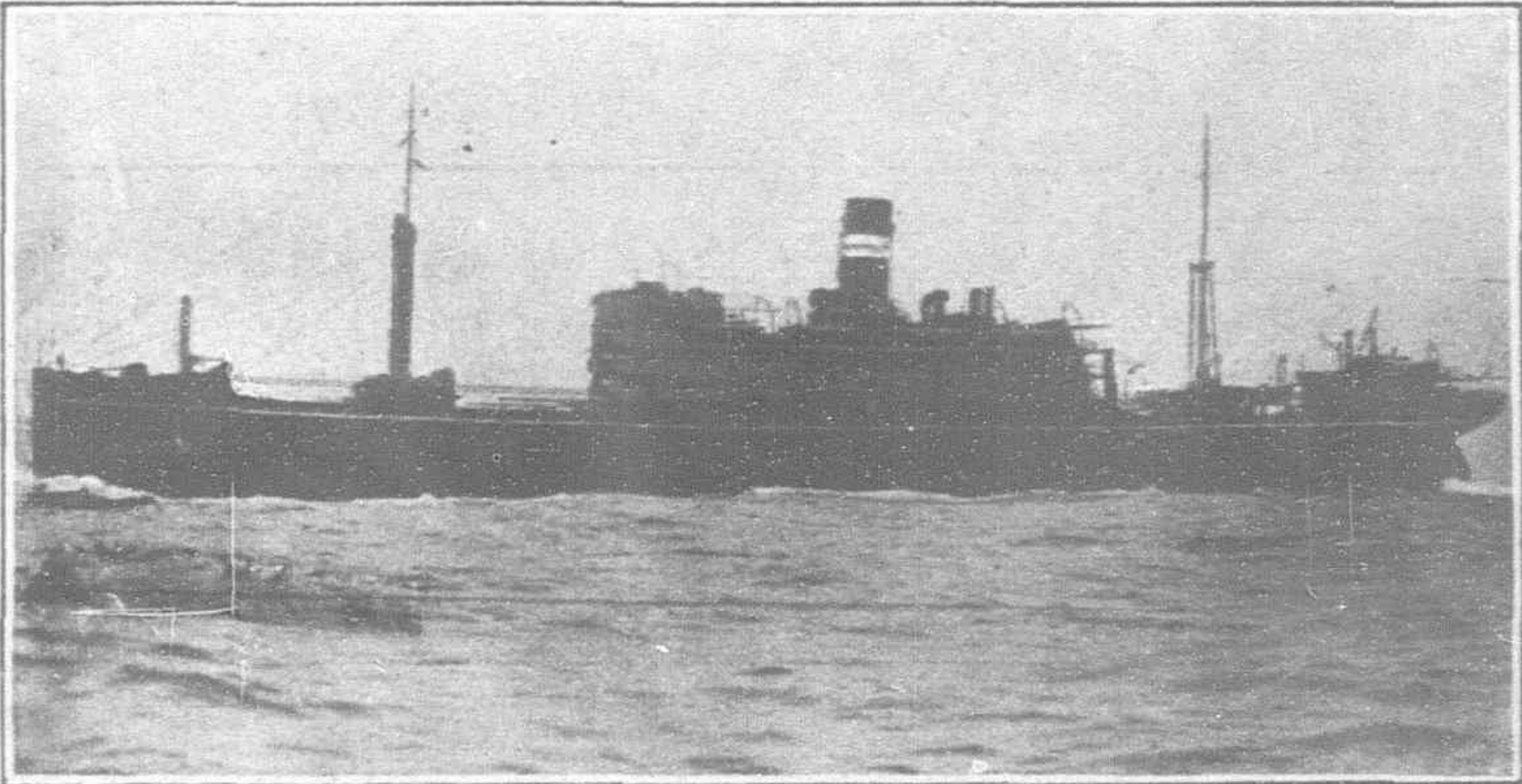
The B.I. Steamer "Sirdhana" Runs Successful Trials

The *Sirdhana*, which has been built and engined by Messrs. Swan, Hunter and Wigham Richardson, Ltd., at their Neptune Works, Newcastle-on-Tyne, to the order of the British India Steam Navigation Company, Ltd., has just completed very successful trial trips on the Tyne.

The *Sirdhana* is a steel twin-screw passenger and cargo steamer and is a sister ship to the *Santhia*, built for the same owners at the same works, and which has been satisfactorily running on her service since the early part of 1925.

The steamer is 450 feet in length by 57 feet 9 inches broad, by 36 feet 6 inches deep, and is designed to carry a deadweight of 9,500 tons on a draft of 27 feet. She has been built to Lloyd's highest class and complies with the Board of Trade convention requirements for carrying passengers.

Amidships there is well furnished accommodation for the first class passengers, 30 in number, with staterooms and a large dining saloon on the bridge deck to seat 45, while on the promenade deck above is the first class entrance hall and lounge and adjoining is the smoking room.



The s.s. *Sirdhana*, which, with its sister ship the *Santhia*, was built in 1925 by Swan, Hunter and Wigham Richardson, Ltd., Newcastle-on-Tyne, for the British India Steam Navigation Co., Ltd. The vessels are exactly similar in all specifications.

The second class passengers, 30 in number, are on the same decks. They have a comfortable dining saloon and a large entrance lounge and smoke room combined. All weather decks are of teak, and arrangements can be made for carrying a large number of native passengers, in part of the upper deck and 'tween decks, and there is also special provision for carrying horses.

The vessel is well fitted up with most modern and improved auxiliary machinery, both for the hull and the engine room, including steam steering gear on rudder head with telemotor gear, 12 steam winches, together with the usual derricks, etc. She is fitted with electric light throughout and ample ventilation by electric fans and other means, and protection from sun by wood or canvas awnings. There is, of course, a wireless installation, a large number of steel lifeboats, steam heating and refrigerating machinery together with the necessary insulated store rooms for the ship's provisions.

The machinery, which worked to the satisfaction of all concerned on the trial trip, consists of two sets of triple expansion steam engines, which together with the boilers have also been built at the Neptune Works of Swan, Hunter and Wigham Richardson, Ltd., and which propelled the vessel at a speed of over 14 knots.

A Pine Lumber Operation in the Philippines

(Continued from page 74.)

perfection at home that it would bring a smile to the lips of anyone acquainted with our large plants. This is the method of transferring cut lumber around the Heald docks. Here, instead of electric trucks or the overhead track system, patient carabao (water buffalo) slowly trundle their primitive two-wheeled carts on which the timbers have been loaded. The only competition in originality these slow beasts have in the Far East is the remarkably efficient elephant labor utilized in the lumber yards of Ceylon.

Still another point of great difference between the Heald and the home plant can be found at the blacksmith shop. Here the visitor finds an answer to a question he has asked himself throughout his spider's journey over the aerial: "How is the task of keeping up such an elaborate system made practical?" At the shop he finds the smiths welding and forging truck parts and station tackle after patterns especially adapted to the demands of Mr. Heald's system. Every part has been reduced to its simplest and most foolproof form. The cost of producing them in his own shop is way under the expensive prices of similar apparatus manufactured in the States, and explains one reason why Mr. Heald has made a successful fight against terrific odds.

The Federated Malay State have placed a contract to the value of \$30,000 with Messrs. Ropeways, Ltd., of Westminster, for an aerial ropeway for tin ore transport.

Large orders for submarine cable have been placed with British makers recently by the Pacific Cable Board in connection with the duplication of the All Red route to Australia. The section between Bamfield (Vancouver) and Fanning Island, 3,458 miles in length, is being made by the Telegraph Construction and Maintenance Company of Greenwich, while the section between Fanning Island and Suva (Fiji) is in the hands of Messrs. Siemens Brothers of Woolwich.

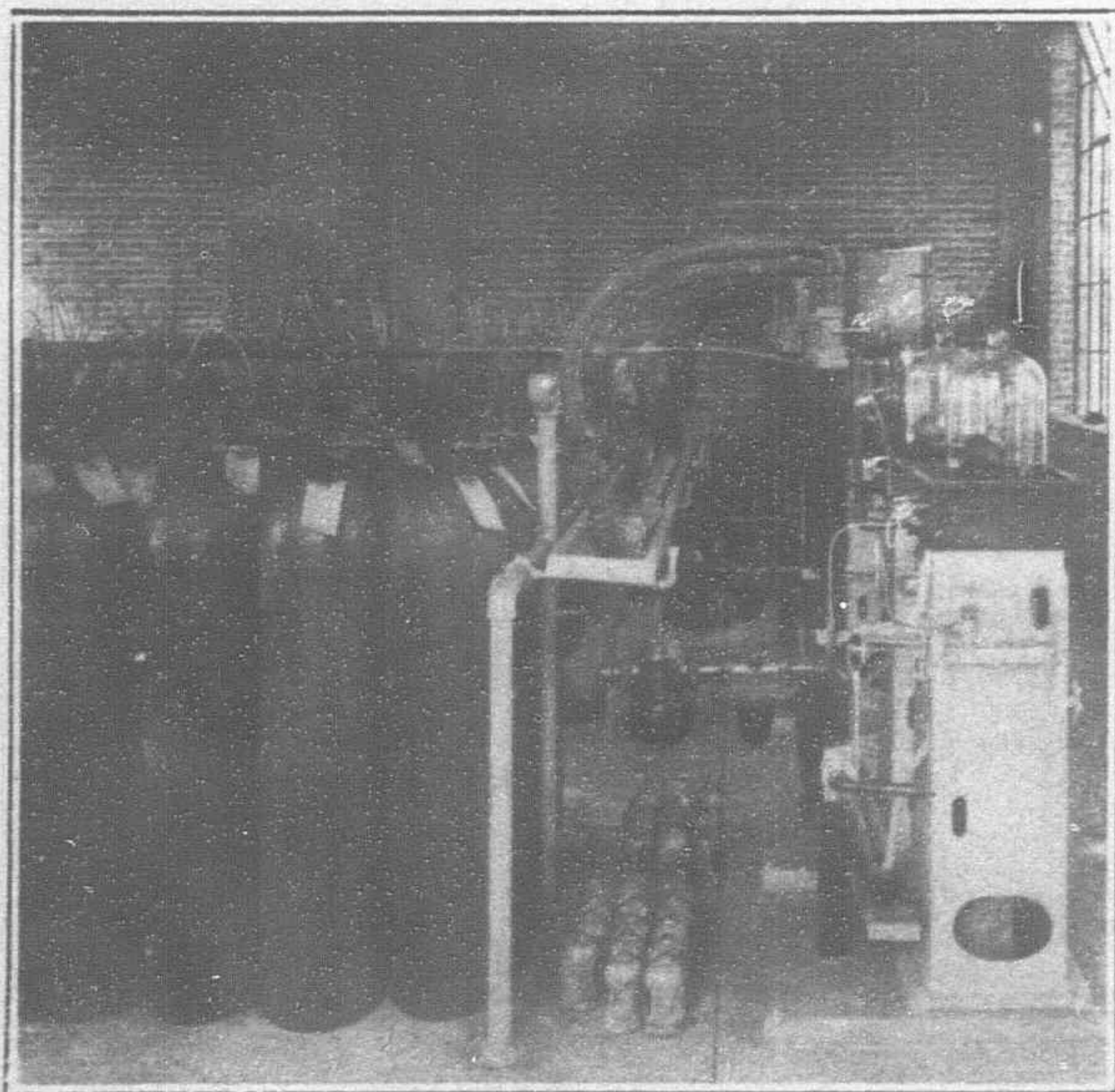
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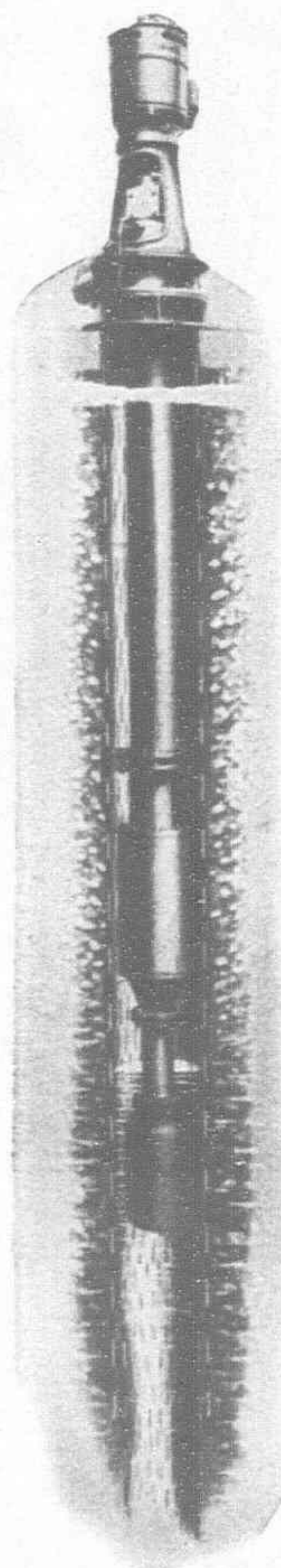
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